International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.05, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

Low Harmonic DISTORTION INVERTER Using PWM

Ankush Kumar[1], Deepti Rawat[2],

Prabhat Shukla[3] ,Shikhar Yadav[4]

IIMT COLLEGE OF ENGINEERING, GREATER NOIDA

ABSTRACT

The main aim of this project is to explain the effects of Harmonics in the Power System and steps to reduce the effects of Harmonics. This project will also explain how Harmonic distortion is one of the most important problems associated with power quality and creates several disturbances to the Power System. It includes the Harmonic reduction techniques to improve the power quality and it also includes the simulation for the same.

In an inverter DC voltage is converted into an AC output. During this transformation from DC to AC, harmonics affect the the power quality a lot. How harmonic reduction will improve the power quality is explained in detail. Different Modulation techniques are suggested for use in electronic converters' applications for getting minimized Total Harmonic Distortion. One of such techniques a Selective Harmonics Elimination Pulse Width Modulation scheme. Specific odd harmonics can be mitigated by operating the semiconductor switches in H-bridge inverters at optimized switching angles of the PWM signals. These switching angles are determined by calculating a set of nonlinear equations. Multilevel converters operated by PWM, suffer from the issue of harmonic spikes in the output voltage. In this paper, an improved scheme of SHE-PWM is proposed for multilevel converter to mitigate THD and supress the harmonic spikes of the system. To investigate and confirm the proposed technique, a five-level cascade multilevel inverter is simulated, and experimentally implemented. It is seen that the simulation results are verified experimentally by eliminating low-order harmoinics in getting a THD of 23.20% without using filter. The experimental results of the developed multilevel converer is validated with the simulation results under different performance conditions which show a complete agreement between them in terms of shapes and values.

I.INTRODUCTION

The term harmonics referred to Power quality in ideal world would mean how pure the voltage is, how pure the current waveform is in its sinusoidal form. Power quality is very important to commercial and industrial power system designs. Ideally, the electrical supply should be a perfect sinusoidal waveform without any kind of distortion. If the current or voltage waveforms are distorted from its ideal form it will be termed as harmonic distortion. This harmonic distortion could result because of many reasons. In today's world, prime importance is given by the engineers to derive a method to reduce the harmonic distortion. Harmonic distortion was very less in the past when the designs of power systems were very simple and conservative. But, nowadays with the use of complex designs in the industry harmonic distortion has increased as well.

This project explains the effects of Harmonics in the Power System and steps t`o reduce the effects of Harmonics. This project will also explain how Harmonic distortion is one of the most important problems

associated with power quality and creates several disturbances to the Power System. It includes the Harmonic reduction techniques to improve the power quality and it will also include the simulation for the same.

This project also explains different types of inverters that are used in the Power System. During the transformation from DC to AC, harmonics affect the power quality a lot. How harmonic reduction will improve the power quality will be explained in detail.

.PROBLEM STATEMENT

- **Heating of equipment due to harmonic distortions.**
- **Reduced life expectancy.**
- **Dysfunctionality in devices over time**

Description: An alteration of the pure sine waveform (sinewave distortion), due to nonlinear loads.

Causes: Harmonic distortion can be generated by a load and fed back into the AC mains, causing power problems to other equipment on the circuit. Generally transmitted by nonlinear loads. Switch mode power supplies, variable speed motors and drives, process equipment, PR copiers and fax machines are examples of non-linear modes.

Effect: Can cause excess heating in motors, transformers and wiring; communication errors; hardware damage and lowers operating efficiency of office equipment.

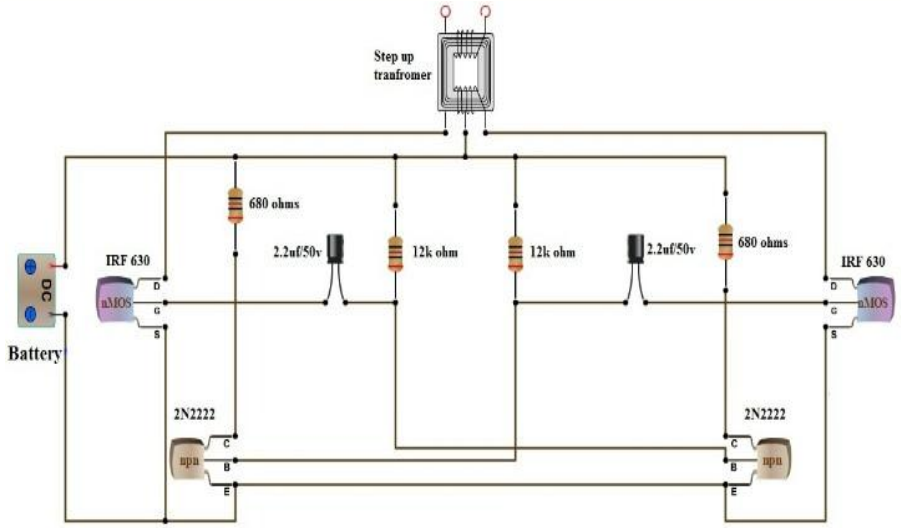
III.RESEARCH OBJECTIVE

To reduce the harmonic distortions in an inverter up to a significant level. The main objective of the power system would be generation of electrical energy to the end user. Also, associated with power system generation is the term power quality. So much emphasis has been given to power quality that it is considered as a separate area of power engineering. There are many reasons for the importance given to the power quality. One of the main reason is, the consumers are well informed about the power quality issues like interruptions, sagging and switching transients. Also, many power systems are internally connected into a network. Due to this integration if a failure exists in any one of the internal network it would result into unfavourable consequences to the whole power system. In addition to all this, with the microprocessor based controls, protective devices become more sensitive towards power quality variation than were the past generation protective devices.

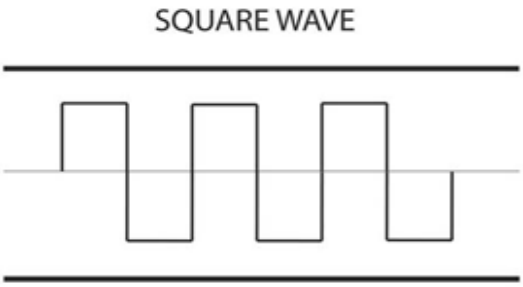
IV. CIRCUIT

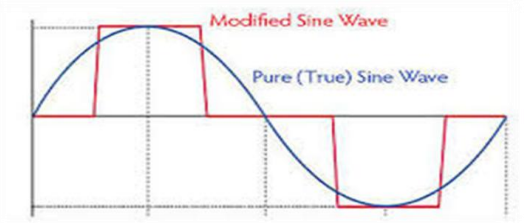
This is the complete circuit diagram of the system.

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.05, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354



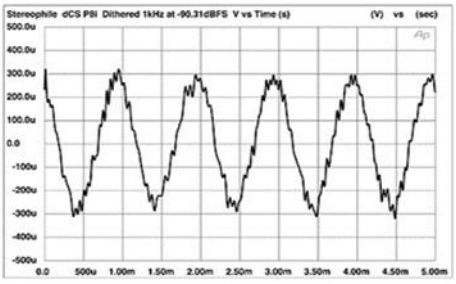
V.OUTPUT WAVEFORM





VI.RESULTS &ANALYSIS

Results include the successful operation of inverter by removing these harmonics as shown in the below figure.



VII.CONCLUSION

This product has the potential to attract customers.

- Very less distortion.
- Efficiency near about 70% to 80%
- Cost effective
- Near about 20,000/- to 25,000/-
- Better lifetime of devices.

VIII.FUTURE SCOPE AND MARKET SURVEY

Due to shortage of power in the country, back-up power system market is undoubtedly growing with newer technologies and methodologies being incorporated and implemented.

Indian UPS market is a steadily growing market with both Indian and multinational manufacturers contending for a major chunk of market share.

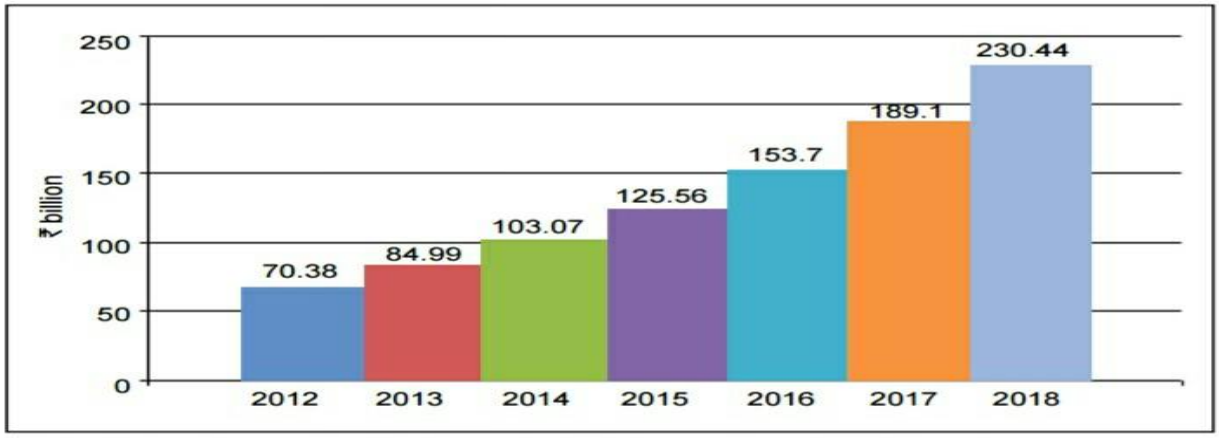


Fig. 1: Inverter market: Value-wise (Data courtesy: Netscribes)

REFERENCES

1. Roger C. Dugan, Mark F. McGranaghan, H. Wayne Beaty : Electrical Power Systems quality. New York : McGraw Hill, c1996
2. J. Arrillaga, N.R. Watson, S. Chen: Power System Quality Assessment. New York : John Wiley, c2000
3. Ewald F. Fuchs, Mohammad A. S. Masoum : Power Quality in Power Systems and Electrical Machines Elsevier Academic Press, c2008
4. Wilson E. Kazibwe and Mucoke H. Senduala : Electric Power Quality Control Techniques. New York: Van Nostrand Reinhold, c1993

5. Elias M. Stein, Timonthy S. Murphy : Harmonic Analysis: Real-Variable Methods, Orthogonality and Oscillatory Integrals. Princeton, N.J.: Princeton University Press, c1993.
6. Issa Batarseh : Power Electronic Circuits. New York : John Wiley, c2004
7. Leonard L. Grigsby : Power Systems. CRC Press, c2007
8. J. Arrillaga, N. R. Watson : Power System Harmonics. New York: John Wiley, c2003
9. An application of PSO technique for harmonic elimination in a PWM inverter from World Wide Web

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W86-4WGK6J4-4&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1114896328&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=d9e37378c6181659a1d2856fabb00184