Design and Simulation of Fly-back converter for Automobile LED Front Lighting Application

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***Abstract*- This Paper Present design and simulation of fly back converter for Automobile LED Front lighting application. In recent years Automobile Industry was growing rapidly. Automobile Industries uses the High Power LED for lighting system which is require in automobile sector. The used of fly back converter for conversion of power stages which can be used for controlling of High power LED used in automobile. This Paper represents MATLAB Simulation model of fly back converter for automobile LED Front Lighting application, this can be useful for automobile design engineers and research.**

Keywords-***Converter, Automobile application, LED, MATLAB Simulink.***

I. INTRODUCTION

Automobile industry has been rapidly switching to high power LED front lighting systems as they have great results in terms of luminous flux and energy efficiency. However, due to the electrical characteristics of LEDs these systems cannot be powered directly from the automobile battery.PWM DC-DC boost converter for automobile LED front lighting systems [1].

For various automobile head lighting system power LED are used. The use of electronic ballast for front light in case of automobile application is increase. The ballast is feed by buck converter for the same application [2].

The switching regulators that power LEDs must have high efficiency, operate over the entire input voltage range provided by the automobile battery and must survive 60V 'dump' voltage transients. This design solution reviews the challenges of efficiently powering switched LED strings from a car battery and proposes a novel buck-boost converter[3].

Now a day's high power LEDs are used for the automobile application, The LED manufacturer mostly used LEDs ranging from 1W to 3W. The different combination are used for the same application such as series, parallel and series parallel multiple LEDs are connected for such high Power operation [4].

LEDs are devices that generate light with a low DC voltage supply source. Their brightness increases with the current through them. LED lighting can be controlled better if their DC current can be well regulated. In addition, the LED must be protected from over current and/or over voltage conditions, and voltage fluctuations. Otherwise, LEDs may perform poorly and show unwanted light flickers, or they can even be damaged permanently. Additionally, the light spectrum of any LED device is Dependent on the current through it. It is usually a common practice to use the LED driver IC to control and maintain a targeted constant LED current among all LEDs over operation. Therefore, a PWM (pulse width modulation) signal is 4 used to turn on and turn off a LED to adjust the overall brightness [5].

A single-stage ac–dc LED driver based on the SEPIC and LLC converters, which obtains high power factor and high efficiency simultaneously ac–dc LED driver based on the boost and LLC converter with high efficiency and low cost. In addition, a hybrid PFM-APWM modulation strategy is also proposed to reduce the bus voltage. The other advantage of this LED driver is long lifetime without electrolytic capacitors by increasing bus voltage ripple [6].

II. SYSTEM DEVELOPMENT

The design of Automobile LED front lighting application using fly back Converter is shown in fig.1.It consist of Battery, Fly back converter, Vehicle head light, PID Controller etc.

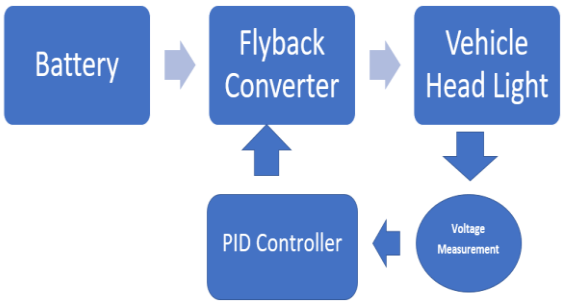

Fig.1.Block diagram of system

2.1 Components Description:

Battery- Battery used as input source for converter, the rating of battery is 12V. It provide source of power which is required for the operation.

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Fly-back Converter- The fly-back converter is used in both AC/DC and DC/DC conversion with galvanic isolation between the input and any outputs. The fly-back converter is a buck boost converter with the Indicator split to form a transformer, so that the voltage ratios are multiplied with an additional advantage of isolation.

PID Controller: PID Controller is used for the Closed loop operation which include feedback system proportional integral derivative is kind of device which control the different parameters .i.e. Temperature, speed, and flow

System Design Parameter:

Parameter	Value
Input Voltage	12 V
Output Voltage	24 V
Change in current	0.0250
Change in voltage	0.1000
Power	60 W
Switching Frequency	5000
Output current	2.5000
Inductor	0.0640
Capacitor	0.0033

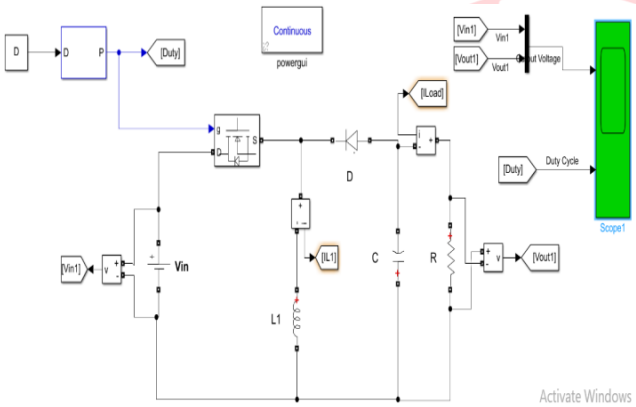

Fig 1. Fly-back Converter

Fly back Converter Design Parameter:

Parameter	Value
Input Voltage	12 V
Output Voltage	09 V
Power	60 W
Switching Frequency	5000
V delta	2

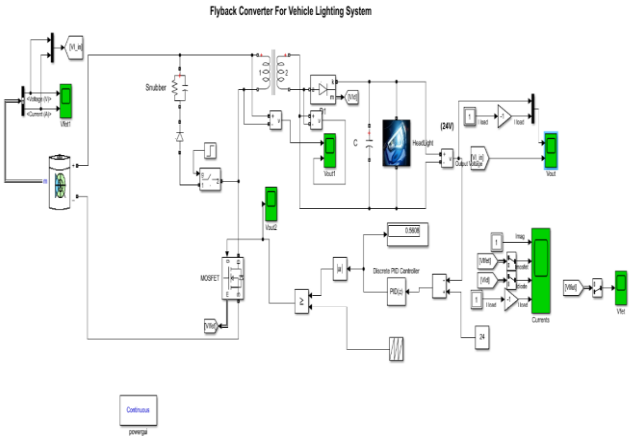

Fig 2. System operation

Fig 2. Shows the MATLAB Simulation of fly-back controller for automobile front light system. 12 V Battery is used as source for fly-back controller indicator split with transformer. The output voltage of 24V is given to headlight. The system is designed for closed loop system with feedback of voltage measurement with PID controller is used to give the same to Fly-back converter.

III. RESULT & DISCUSSIONS

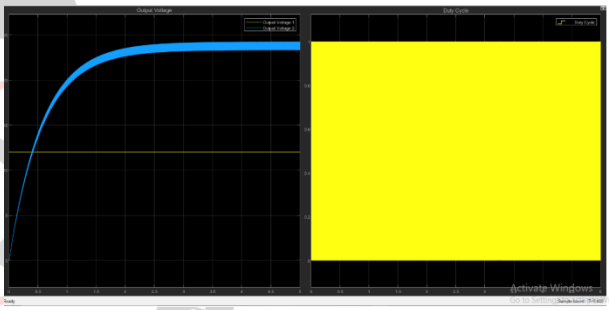

Fig3.1 output voltage

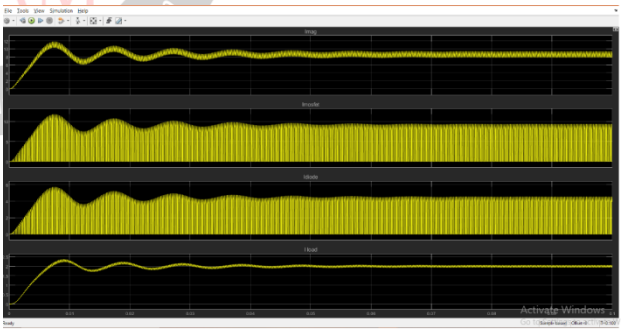

Fig 3.2 load current and voltage waveform

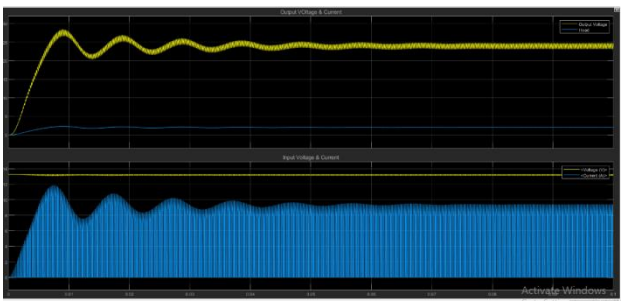

Fig 3.3 l current and voltage waveform

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IV. CONCLUSION

This paper present, MATLAB Simulink model of fly-back converter based front light Automobile system. this system has provision of feedback control system with PID controller. The results shows that Proposed method more suitable for automobile industry.

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