Regenerating the Energy from Building Lift or Escalator

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***Abstract*— Regenerative drives are another remarkable advancement in energy-efficient lift technology. They recycle energy rather than wasting it as heat. The intention of this specification is to set out the standards of the requirement for lift installations. All lifts shall be robust, reliable and shall meet the department users' requirements and expectations. Lift installation must comply with all current regulations, including Building Regulations. The appointed Design Consultant will be responsible for traffic analysis to provide the most suitable lift solution, including items such as size of lift car, contract load, type of load and its associated safety features, speed, number of passengers, etc. Major Modernization is a reasonably straight forward exercise in that, with the exception of the It may be possible to increase the lift speed which would reduce travel time between floors. However, this is governed by strict lift regulations and is only possible where the clear headroom at the top of the lift well and the pit depth at the bottom of the lift well are sufficient to allow this. The clauses in this part of the Specification cover all items which are generally standard in this type of installation, while the Particular Specification, covers the materials and method to be used in the Works, the General and Particular Specifications are to be read as one. Any conflicts shall be brought to the attention of the Contract Administrator. The following clauses apply equally to new lift installations, major modernization and refurbishments. Where existing installations do not comply with these standards they shall be brought up to date as far as is reasonably practicable. Any remaining sections of the existing installations that do not comply with this specification shall be highlighted and drawn to the attention of the Contract Administrator prior to completion.**

1. INTRODUCTION

Systems design and equipment shall ensure whenever mechanical energy is connected to the generator and the electrical energy will go through an initialization routine and saves in the battery minimal associated energy conversation. Which can use for regeneration of electricity. Equipment shall be designed to achieve maximum economic utilization of energy/under full and part load operation. In the event of a power failure or whenever the lift is switched off, the controller will automatically restart on the restoration or re-connection of the power supply and cause the lift to move from its static position. When the lift encounters a floor with auto position reset, the floor value in the controller will be reset and normal lift operation will resume. The design and construction of the bedplate, raft, and steel supports shall be such that the true alignment of the equipment under all conditions is maintained. Roll pins shall be used in the feet of all components to maintain their alignment and position. The power developed by the motor shall be transmitted directly to the driving sheave which is to be located on the same shaft as the motor. The main shaft shall be supported on two large bearings that may be of the sleeve, roller or ball race type.

2. BACKGROUND OF THE INVENTION

Systems and controls use a wide variety of designs to achieve numerous objectives, and the basic principle of balancing an elevator cab against assembly driven by a motor. Building designers authorities have recognized the necessity of emergency power in buildings to ensure that elevator cabs. Moreover, most elevator systems currently require building power distribution systems to provide transfer switches and emergency feeders for elevators and main distribution emergency switchboards and emergency generators sufficiently large to cover elevator loads, all of which result in additional costs and inefficiencies. Thus, it would be advantageous to have an elevator system that during a power outage or any other occasion when needed accomplishes the controlled descent of the elevator cab without a battery or fossil fuel based generator to drive the elevator motor, but rather accomplishes the initial descent of the elevator cab due to gravitational forces

and the heaviness of the elevator cab relative to an attached counterweight, and which then converts kinetic energy of the movement elevator cab into electrical energy used to control the speed of descent of the elevator cab.

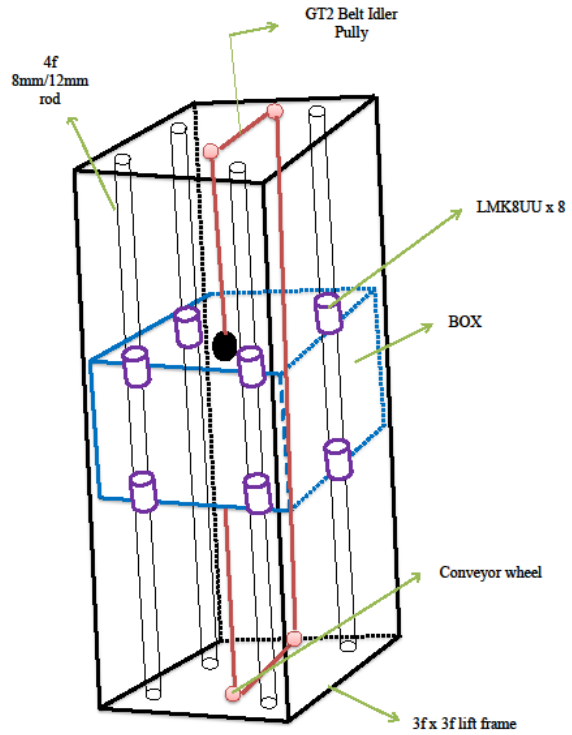

Fig 1: Frame of lift

3. LITERATURE SURVEY

This provides the various surveys done with the references for this project which is been designed by using various hardware components, software tools, new technologies, wired and wireless communication techniques and methodologies.

The following are the brief discussions of the papers referred to do this project are

[1] Hirzel, S., and Dutschke, E. (2010).

From one-off sales of lifts, escalators and air conditioning and ventilation systems to complete packages for commercial and residential building complexes, Mitsubishi electric is ready to provide a solution that best matches building requirement and user needs. Mitsubishi electric lifts are contributing to the development and expansion of high-tech cityscapes around the world, and providing architects and developers with new options for innovative building designs. Unique state-of-the-art technologies are continuously being introduced lift operation and system efficiency.

From providing conventional and customized straight line escalators the production of the world's only spiral escalators, Mitsubishi eclectic is an industry leader in vertical transport. Systems incorporate innovative engineering and energy efficient technologies that ensure operation efficiency, including the at most reliability, durability and safety.

[2] Masaki Nomura, HiroyuIkejima, and Shigetekamorita

The electromagnetic with non asbestos lining shall be spring applied an electrically released type having noiseless operation. The brake capable of stopping and holding the elevator car in its downward travel to rest with 125% of its rated load from the maximum governor stripping speed. In this condition the retardation of the car shall not exceed that result in from the operation of the safety gear or stopping on the buffer. Spring used to apply the beak shoes shall be in compression an adequately supported. Break lining shall be of renewable incombustible materials and shall be secured to the brake shoes such that normal wear shall not weaken their fixings. Band breaks shall not be used.

[3] Ashok B, kulkarni, and Hein Hguyen, IEEE 1431-1437 his paper discus the general characteristic of the energy consumption of lifts and escalators, outline the factor affecting it, and discusses the method used to drive daily and annual consumption.

Lifts usually will generate power back into the supply, and the amount regenerated will depend on the parameters of the specific system. Due to the fact that escalators run continuously regardless of passenger demand, they consume a fixed amount of energy if not boarded by passengers. Two methods are outlined to calculate these fixed losses. Depending on the number of passenger using the escalators, and whether it is running in the up or down direction, the final total energy consumed can be calculated by adding or subtracting the two quantities.

4. PROBLEM IDENTIFICATION

- Power failure: since elevators require a large supply of power from commercial buildings utility systems.

- Voltage updates can effect motor operations and updates to systems can even cause damage to the elevator.
- Worn sheaves: worn sheaves place excess wear on ropes, in turn further increase in the level of wear on the sheaves. Ideally, proper inspection will prevent this from occurring, but once it does begin damages inventible
- Misaligned motor drive problem: shaft alignment is critical when another piece of equipment is couple to an electric motor has improper alignment can caused wear on the motor bearings.

4. METHODOLOGY

The block diagram of the proposed method is as shown below,

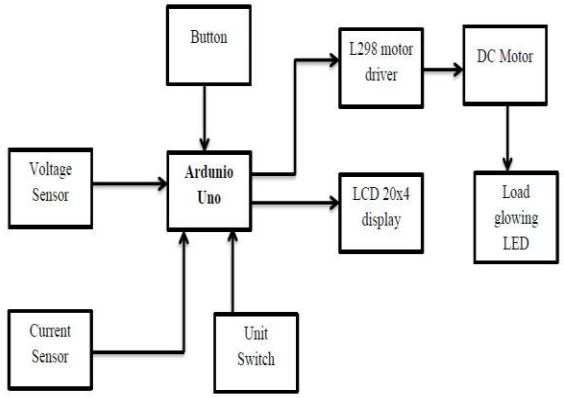

Fig 2: Block diagram of regenerative drives of lift

Arduino board

Fig 3: Arduino board

A 16 MHz clock. This makes it not the speediest microcontroller around, but fast enough for most applications.32 KB of flash memory for storing your code. 13digital pins and 6 analog pins.

These pins allow the user to connect external hardware to the Microcontroller. These pins are key for extending the computing capability of the Microcontroller into the realworld. Simply plug the devices and sensors into the sockets that correspond to each of these pins.

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 16KB ISP flash memory, 1KB SRAM, 512B EEPROM, an 8-channel/10-bit A/D converter (TQFP and QFN/MLF), and debug WIRE for on-chip debugging. The device supports a throughput of 20 MIPS at 20 MHz and operates between 2.7-5.5 volts. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Main wheel DC motor

Fig 4: Main wheel drive motor

The DC motor used to drive wheel is square geared DC motor. It is the heart of the setup. It is the main source through which torque is generated. It provides the very essential torque for the setup to move up and come down along the building.

This motor will be connected to the wheels of the frame that carries the whole setup. This will be of high RPM but will be geared to increase the torque.

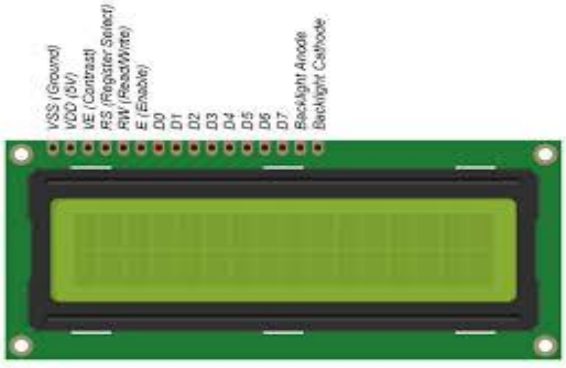

Fig 5: LCD Display

- Character LCD 20x4
- 5x8 dots includes cursor
- Bulit-in controller (RW1063 or Equivalent)
- +5V power supply (Also available for +3V)
- Negative voltage optional for +3V power supply
- 1/16 duty cycle
- LED can be driven by PIN1, PIN2, PIN15, PIN16 or A and K
- Interface : WH2004G - 6800, WH2004G1 - SPI, WH2004G2 - I2C

5. OBJECTIVES

In this entire course of project our major objective is to change the obsolete methods being currently followed in Indian elevator systems. The objectives of the project are outlined as below:

- This project work is mainly focused on regeneration of power by adapting the lift power regeneration technology, using reclaiming energy for a useful purpose rather than wasting it has heat is an effective from of overall energy conservation.
- To find the properties and analysis of power generation.
- Cost reduction of maintenance for existing operation .
- To meet the challenge of energy conservation, one of the latest technologies adopted in lift regenerative function.
- Regenerative lifts are 20% to 30% more energy efficient.
- Implementation of software based electronic system.

6. ADVANTAGES AND APPLICATION

- Efficiency is high.
- Power consumption is less.
- It helps in reducing the power consumption.
- It helps in reduce the amount of wasted energy.
- it is used in shopping mall, office buildings and factories transport of vehicle.

7. CONCLUSION

In this project an accurate evolution of energy steam in roped elevator has been done using an accurate system model. Hence, a retrofit kit has been studied and designed to store the regenerating mode of the electrical machine with the aim to recover it back during motor operation. In order to estimate the benefits of this solution, a comprehensive evaluation of the saved energy, parameterized with the number of passengers and lift duty cycle, have been presented considering different scenarios.The proposed recovering energy system is suitable to retrofit a wide variety of existent slandered elevator as it does not require substantial modification to the system, while ensure higher system reliability acting as a energy buck-up in case of grid fault.

REFERENCES

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[3] Ashok B. Kulkarni, HienHguyen and E.W. Gaudet “A Comparative Evaluation of line Regenerative and Non Regenerative Vector Controlled Drives for AC Gearless Elevator”, IEEE 1431-1437 ...

[4] PiroteBrikapkul., The design of the feedback controller in integral self-adjusting for permanent magnet synchronous motors, Master degree thesis, Electrical Engineering, KMUTNB Thailand, 2546.