Save the diesel during idling run over of locomotive used in industries

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Abstract This paper is practically Observation done during internship in steel industry. There is wastage of diesel in locomotive during idling run hours. In industries locomotives which are use for internal shifting of raw material & molten metal from one place to another place within industries. problem facing industries shunting locos having a two diesel engine which is used to drive the traction generator produce the electricity and generator drive a electric traction motor, these are divide into two engines Capacity of one diesel engine is 350HP and another diesel engine capacity 350HP in a single locomotive. Each diesel engine coupled with traction generator Utilizing the single engine during idling hours (it was waiting for load a few minutes to hours) during this time wastages of fuel due to the negligence of loco pilot not following the standard instruction.

Keywords: shunting, locos, Arudino, traction.

NTRODUCTION

An industry producing 12 Million Tonnes of Steel per annum, aiming to achieve 16 MTPA in coming years. To cater the raw material requirement also to dispatch the finished products, we have a rail infrastructure at our plant premises. Raw materials received at Ports such as GOA, Krishnapatnam, and Ennore are moved in to our plant by Railway wagons.

The finished products such as Hot Rolled Coils, Cold Rolled Coils are also dispatched majorly by Indian Railway network. To produce this capacity of Steel,

\we are to bring in nearly 40 Mtpa of various types of raw materials and also move nearly 10 Mtpa of finished products. Both inbound and outbound traffic can be handled majorly by having our own Locomotives and Railway Yards. Logistic department internally has an infrastructure of 40 Locomotives, 188 km of Track and other handling facilities such as Cranes, Forklifts, Floor Tilters, and Arial Coil Tilters.

II. PRESENT LOCOS WORKING SYSTEM AND ITS EFFECTS

Single engine consuming a Three liters of diesel per hour.

Considering two engines, consuming Six liters per hour.

Single locomotive produces a 2.5Kg of Carbon Dioxide per hour.

In industries per day minimum five hours each locomotive was in idling condition i.e. no movement or waiting state.

In any big industries the locomotive is required for transmitting bulk of output product from various location of plant; it was only possible by using locos with in industries.

PRESENT SCENARIO

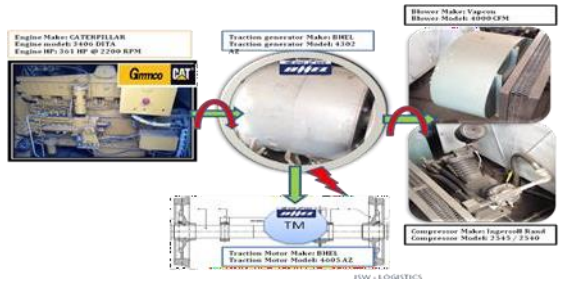


Fig. (1) Practical view of parts in locomotive

Fig.(2).Different types of loco are used in industries

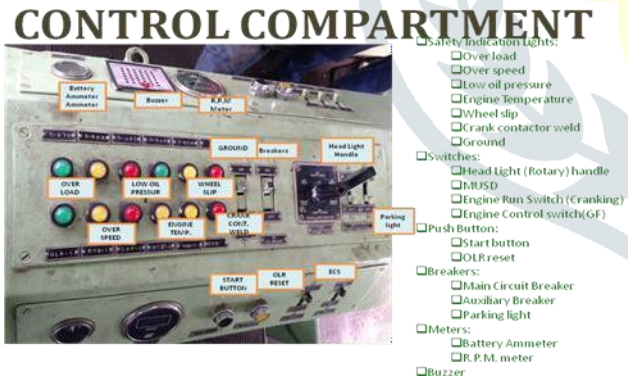


Fig.(3).Practical view of control desk in locomotive

III. PROBLEM IDENTIFICATIONS

The major problem facing in industries locomotive is wasting of diesel during idling hours and during empty conditions. A one locomotive is divided into two engines, example if total capacity of engine is 700HP they divided into 350HP, 350HP engines. As Per the standards during loading two engines are in running condition, during idling conditions the one engine should work. If loco consume six liters per hours during idle hours (locos without load) so the fuel gets wasted during idling conditions. Two engines are running in order to overcome this problem. By our automation technology automatically loco get shutdown during idling hours by taking feedback signal from different parts of locos.

Locos are classified into two types, External Combustion Engine; fuel is burnt outside the cylinder ex. Steam Engine.

In case of internal Combustion Engine; fuel is burnt inside the cylinder due to which gases heats-up and expand inside cylinder which pushes piston downward. This reciprocation motion is converted into rotary motion by the piston mechanism of crank shaft. It has two types Petrol and Diesel.

Example: Car, Bike, Locomotive.

IV. SOLUTION TO THE PROBLEM

In industrial applications different types of technology are used for controlling related application like monitoring of locomotive activities. In industries some processes cannot be controlled by human beings with good accuracy. The main objective of this paper is to overcome the diesel consumption during idling run hours and possible to work at shunting locomotive in industries by using the automation techniques. We made this as fully automatically ON & OFF using sensors & Arduino circuit board to save the diesel & also reducing the atmospheric pollution.

V. CAPITAL COST AND SAVING OF DIESEL

For example in Jindal steels Pvt.Ltd. having 40 locomotives which are used for shunting output product from one location of plant to another location of plant

Considering consumption of diesel/hour is 3 letters × 40locos =120liters/hour

120liters × Maximum idle hours/day is 5 hours =600 liters.

Saving of fuel per day 600liters. Saving of fuel per annum =

365days × 600liters/day=219000liters per annum.

we can control pollutions produced by locomotive during idling hours around 500Kg Carbon dioxide

VI. THE PROPOSED METHOD

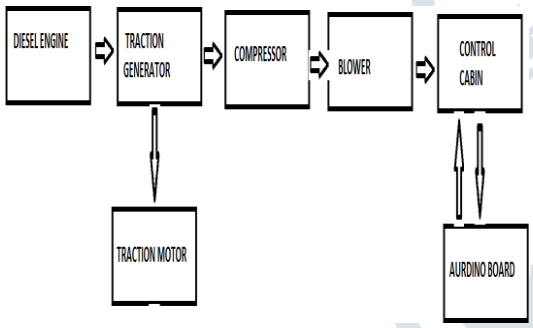


Fig. (4) Proposed method block diagram

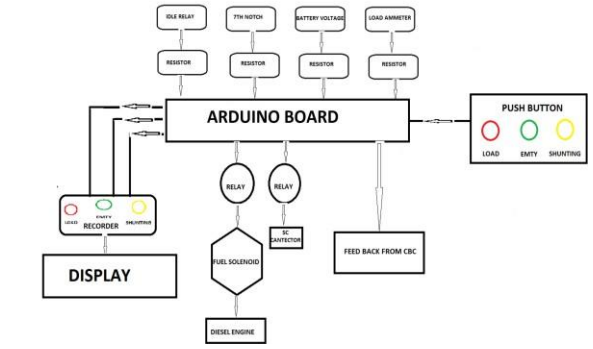


Fig (5) Controlling the diesel engine ON/OFF by receive the command from different equipment

WORKING OF PROPOSED METHOD

CONDITION1

During starting the locomotive battery voltage should be 24V DC. Pilot initially ready starts the locomotive with the help of battery supply, by this Arduino kit starts. Along with this further Arduino kit allow for next conditions to work properly. If battery supply was less than 24V DC during starting Arduino kit will not switches on & not taking any further actions or satisfying any of conditions. If there is no load on wagon or load was detached from wagon two engines are running in idle condition for more than five minutes by automation (Arduino) kit the idle relay gets activated and alternator maintains battery in initial condition. Once the idle relay was in on condition one engine safely goes to shutdown condition.

CONDITION 2

Two alternators are used to supply 24V DC output for battery charging and this will keep the working of Arduino kit continuously by sensing the load by sensors or idle conditions properly. While locomotive was moving the output from the alternator goes to generator field excitation purpose.

CONDITION 3

Idle relay should energise during idling hours and switches off one engine in correct time, after waiting to the load for five minutes.

CONDITION 4

When the load is detached two sensors gives negative signal to Arduino kit, if this condition was satisfied arduino kit send the command signal to shutdown one engine. At any moment if one engine was not in working condition Arduino kit display the message FAULT CONDITION on display board until the fault should be cleared. Arduino kit

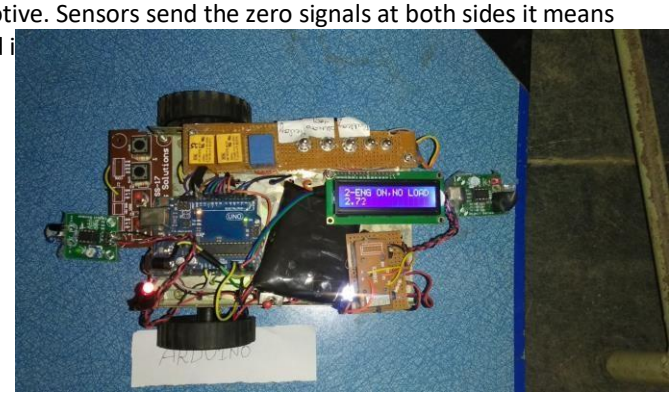
(automation system) shutdown another working engine only when the fault gets cleared, otherwise it will not allow to shutdown (healthy) another working engine. Arduino kit will record all conditions like how many times shutdown of engine was done and idling hours per day.

RESULTS OF PROPOSED SYSTEM;

Picture 1 : Initially the two engines are in off condition as shown in display

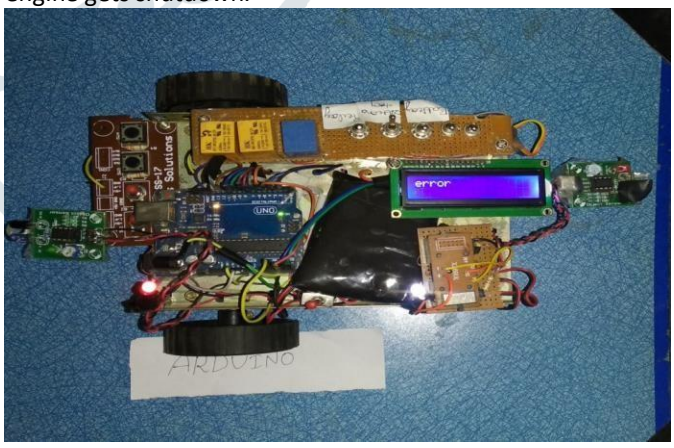
Picture 2: Display showing that load is attached and two LEDs are in on condition. LEDs are indicating that two engines are in on position.

Picture 3: Display showing that load is detached; it was sensed by the sensor at two ends of the locomotive. Sensors send the zero signals at both sides it means no load i



Picture 4: If no load on both sides of loco motive the timing starts counting and waits for more than five minutes.

Picture 4: More than five minutes if load was not connected, arduino checks the condition of alternator battery voltage idle relay if this condition is satisfied one engine gets shutdown.



Picture 5

Picture 5: More than five minutes if load was not connected, arduino checks the condition of alternator battery voltage idle relay, if the battery voltage was low engine will not shut down until problem rectified. In locomotive the separately excitation generator is used, if battery voltage is low generator takes supply from alternator for excitation.

The alternator was used for both purpose one for battery charging purpose another purpose excitation purpose.

VII. CONCLUSION

In this paper, we introduced latest technology in industries locomotive for saving the diesel during idling run over and auto controlling the locomotive using Arduino. Our system can be practically implemented in industries locomotive; it was low-powered, low-cost system and also reduces the environmental pollution.

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