Journal of Mechanical Engineering and Research Developments

Volume No. 11

Issue No. 2

May - August 2023

ENRICHED PUBLICATIONS PVT. LTD

S-9, IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR-5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-47026006

Journal of Mechanical Engineering and Research Developments

Aims and Scope

Subject areas include, but are not limited to the following fields:

- Aerodynamics
- Aerothermodynamics
- Automotive Engineering
- Computer Aided Engineering
- Component Manufacturing
- Conveyors
- Energy Studies
- Engines and Turbines
- Engineering Education

Journal of Mechanical Engineering and Research Developments

Journal of Mechanical Engineering and Research Developments

(Volume No. 11, Issue No. 2, May - August 2023)

Contents

Sr. No	Article/ Authors	Pg No
01	Design of Military Robot - *Ajinkya Subhash Jadhav, Mahesh Mahadev Dhavale, Nayan Hanumant Sonavane, Vishal Prakash Sonawane, Prof. N. R. Karape*	49 - 54
02	Cellular Factors of Immunity of Animals Vaccinated Against Chronic Exposure to Dichloropropaphos - *Sadykov I. Sh., Salomov B. H., Avizov S. R., Yo. Yo Khamidov*	55 - 58
03	Design and Development of Tumbling Machine - *Atharva Suresh Thorat, Shubham Subhash Hulavale, Amol Balaji Pawar, Pratik Nandkishor Jadhav, Prof.v.s. Dixit*	59 - 64
04	Overview of Fixture Design For Industry - *Vaibhav Vinayak Bhosale, Abhijeet Rajendra Mekha, Vaibhav Vijaykumar Matole, Anil Achyutrao Kale, Prof. Sanket S Chikshe*	65 - 68
05	Design and Development of Digital Fuel Level Indicator for 2 Wheeler Splender Vehicle - *Pratik Manu Chikane, Nikhil Sanjay Dalvi, Rajkumar Dayanand Rathod, Mankesh Ajay Bhagat, Prof. Nilam R. Karpe*	69 - 74

Design of Military Robot

Ajinkya Subhash Jadhav [1], Mahesh Mahadev Dhavale [2], Nayan Hanumant Sonavane [3], Vishal Prakash Sonawane[4], Prof. N. R. Karape[5]

[1]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S.,India

[2]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S.,India

[3]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[4]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[5]Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

ABSTRACT

Robotics is playing very crucial role in various defense applications. In situations like war, saving life of each solider is very important. With development of technology in robotics today we can think of robot army for several critical situations on war field. Robotics has opened up the doors of opportunities to complete some work through robots. The moving machines with cameras are very popular to have watch on any activities going on in remote areas. Every country is willing to develop the most effective machines for military applications which can either work in war on front or can handle the activities happening in backside camp. Authors have presented the design of robot for military applications to complete some important tasks like moving some material from one place to other, keeping watch with camera.

KEYWORDS: Military robot, robotics, Motors, Controller, etc.

INTRODUCTION:

Robots are always the area of attraction for research and development committees working to develop military applications. The technology has made it possible to develop the robots which are capable of working in all environmental conditions. The waterproof, night and better clarity cameras are available for robotics applications. The uses of drone cameras are very common now a day right from controlling mob to other applications like controlling movement of people in particular area.

Authors have developed the prototype of robot which can be used for robotics applications. Authors have designed it to complete the task like transportation of some material, picking up some material recording a video, capturing the images etc. CAD design for the same is presented in this paper by authors. Computer programming and interfacing of microcontrollers has made it possible to control the movement of robots from remote places. Implementation of artificial intelligent will open doors of opportunities to completely handle working of these machines effectively.

The use of modern technology in war is need of any nation. Even though no one wants to start a war with other nations still every country is preparing with development of weapons and their testing for any worst situation. Vehicles running on ground with weapons added to it can be very important in nation's safety.

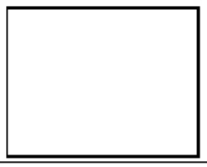
OBJECTIVES OF WORK:

The objectives are,

- Developing robot for security and surveillance.
- Designing the system for GPS enabled location sharing on robot.
- Designing CAD model for robot.

SYSTEM REQUIREMENT:

Table.1: Specifications of main components

Sr. No.	Component Details	Picture of Component
1	**Chassis** Aluminum angle, 2x2 inch	
2	**Motor Shaft** Stainless Steel, 4 mm dia.	
3	**Supporting Frame** Aluminum strip, 50mm width & 2mm thick	
4	**Electromagnetic gun cylinder** PVC 2-inch Dia. Length- 600mm	
5	**Staircase Arm** Rubber & Iron, Belt-60mm width & wheel dia-80mm	

6	**Gripper arm support** Stainless steel, length-200mm	
7	**Screws** Length-10mm,20mm,30mm	
8	**Joints** Stainless steel, Length-50mm-strips	
9	**Bore Wheels** PVC, 4 inch dia.	
10	**Wireless Camera** 1.8Gram, 120mA, 5V	
	Zeegbee Transmitter-Receiver 250Kbps, 200Ft range	

SYSTEM DESIGN:

Authors have developed the CAD design for robot hardware to be developed. The detail views are as shown below.

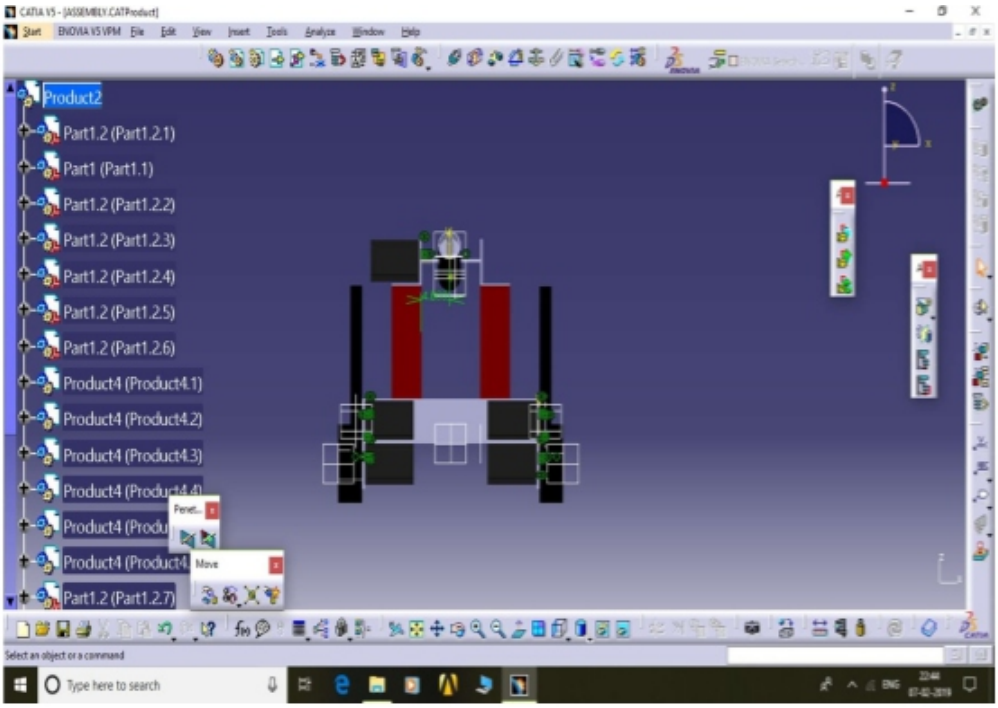


Fig.1: Front view of CAD Model for Robot

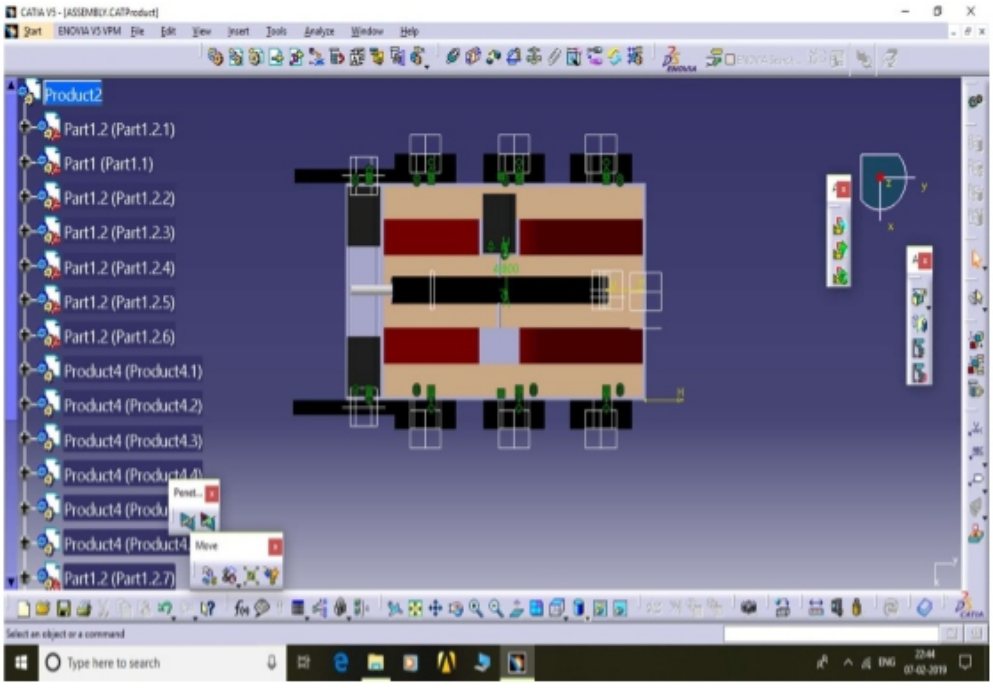


Fig.2: Top view of CAD Model for Robot

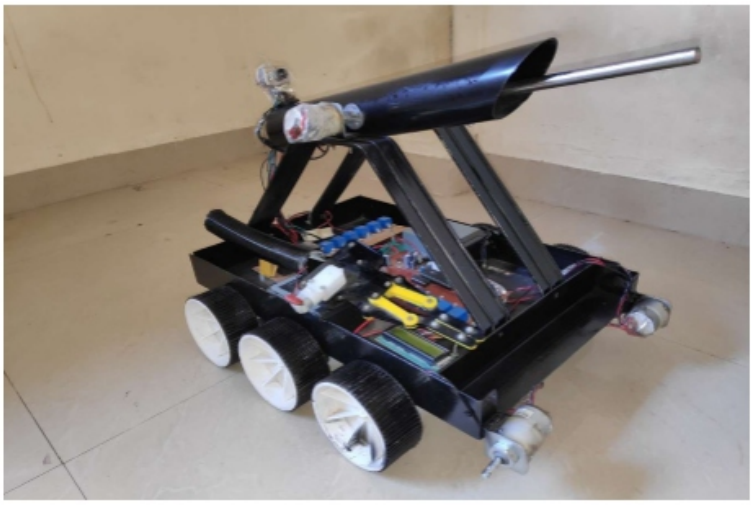


Fig.3: Hardware Developed for Military Robot

FUTURE SCOPE:

The developed robot can be further modified with use of various ultra-sonic sensors, artificial intelligence, accurate GPS system and high definition cameras. The use of hardware like Arduino can be implemented to reduce the cost of control circuit. Selection of material for capacity to work in all temperature ranges.

CONCLUSION:

Robotics is developing in many countries at fast rate since few years. The applications of robotics are common now a day for surveillance purpose. The capacity of surveillance, audio-visual recording and location sharing makes these robots suitable for applications of military operations. For any machine when it is used for saving a human life can be considered as the most important application. Robots for wars are most awaited weapons for all countries over the world. Every country needs replacement of soldiers with machines as this can be most revelatory technology if machines found suitable for war. Authors have developed and hardware and also presented the CAD design for military robot in this paper.

REFERENCES:

1) *Ashokkumar, M., and T. Thirumurugan. "Integrated IOT based design and Android operated Multi- purpose Field Surveillance Robot for Military Use." International Conference for Phoenixes on Emerging Current Trends in Engineering and Management (PECTEAM 2018). Atlantis Press, 2018.*
2) *Zhu, Aibin, et al. "Innovative Design for Portability of Unpowered Military Load Exoskeleton Robot." 2018 IEEE International Conference on Information and Automation (ICIA). IEEE, 2018.*
3) *Ghouse, Zubair, Nishika Hiwrale, and Nihar Ranjan. "Military Robot for Reconnaissance and Surveillance using Image Processing." International Research Journal of Engineering and Technology (IRJET) (2017): 1767-1769.*
4) *Siegel, Jason B., et al. Cooling Parasitic Considerations for Optimal Sizing and Power Split Strategy for Military Robot Powered by Hydrogen Fuel Cells. No. 2018-01-0798. SAE Technical Paper, 2018.*

5) *Choi, Sang Yeong, and Ji Hyeon Yang. "Analysis of the Human Performance and Communication Effects on the Operator Tasks of Military Robot Vehicles by Using Extended Petri Nets." Korean Journal of Computational Design and Engineering 22.2 (2017): 162-171.*
6) *Ghute, Minal S., Kanchan P. Kamble, and Mridul Korde. "Design of military surveillance robot." 2018 First International Conference on Secure Cyber Computing and Communication (ICSCCC). IEEE, 2018.*
7) *Joshi, Shreedhar A., et al. "Wireless controlled military combat robot system." 2017 2nd International Conference on Communication and Electronics Systems (ICCES). IEEE, 2017.*
8) *A.V. Chavan , Dr. J. L. Minase , "Design Of A Differential Drive Mobile Robot Platform For Use In Constrained Environments", IJIERT - International Journal of Innovations in Engineering Research and Technology, Volume 2 Issue 6, ISSN : 2394-3696*
9) *Dewi, Tresna, et al. "Neural network controller design for a mobile robot navigation; A case study." 2017 4th International Conference on Electrical Engineering, Computer Science and Informatics (EECSI). IEEE, 2017.*
10) *Bhat, Sandeep, and Manjalagiri Meenakshi. "Military Robot Path Control Using RF Communication." Proceedings of the First International Conference on Intelligent Computing and Communication. Springer, Singapore, 2017.*
11) *Boos, Lauren, and Lilia Moshkina. "Conveying Robot State and Intent Nonverbally in Military- Relevant Situations: An Exploratory Survey." International Conference on Applied Human Factors and Ergonomics. Springer, Cham, 2019.*
12) *R.Mirnali Tickoo , Pramod Singh Chauhan , Madhura Tondare, Prof.Priya Sawant , "Wireless Inspection Robot", IJIERT - International Journal of Innovations in Engineering Research and Technology, IOTTSF-2016, ISSN : 2394-3696*

Cellular Factors of Immunity of Animals Vaccinated Against Chronic Exposure to Dichloropropaphos

Sadykov I. Sh.[1], Salomov B. H.[2], Avizov S. R.[3], Yo . Yo Khamidov[4]
[1,2,3,4]Bukhara engineering Institute of Technology
Uzbekistan. Bukhara.

A B S T R A C T

This article considers the results of studies of the state of cellular factors of immunity of animals vaccinated against the background of chronic exposure to dichloropropaphos. T- and B- lymphocyte populations as well as phagocytic neutrophil activity in the NST test were studied from cellular immunity factors. Based on the obtained results, it is concluded that chronic intoxication of animals with dichloropropaphosae, even in the dose at the level of MDU in foods, causes suppression of the functional state of immunocompetent cells, which is manifested by reduction of T and B lymphocytes and HST positive neutrophils of peripheral blood.

KEYWORDS: Pesticide, cellular immunity, lymphocytes, neutrophils, dichloropropaphos, E-rosette formation, EAC-rosette formation.

RESEARCH MATERIALS AND METHODS

As a pesticide, 50% of a dichloropropaphos emulsion concentrate manufactured by Bayer of Germany was used in experimental studies.

Experiments were performed on 17 lambs of Karakul rock of 4 months age. Maintenance and feeding of experimental animals was carried out in accordance with the standards adopted in vivaria UzNIVI.

Chronic intoxication was reproduced by daily oral administration into aqueous suspensions of the preparation via an esophageal flexible probe at multiples of 1/50 and 1/500 of LD 50.

Possible negative effect of dichloropropaphos on immunobiological reactivity of animal organism was evaluated on the basis of complex of indices including: determination of populations of E- and EAC-rosette- forming lymphocytes, according to methodical instructions of EES [1]; Phagocytic activity of neutrophils - in HST-test [4].

For immunization of animals, concentrated GOA vaccine UzNIVI against colibacteriosis and salmonella of young farm animals was used according to the developed instructions for its use.

RESULTS OF RESEARCHES

17 Karakul lambs of 4 months weighing 16-20 kg were used, which were divided into 6 groups. Cell immunity factors were studied in animals vaccinated against colibacteriosis against chronic exposure to dichloropropaphosae at doses of 1/50 and 1/500 of ЛД50. These pesticide concentrations were 20 and 2 mg/kg of feed, respectively [2,3,4]. According to D.S. Muratov et al. (1987), the minimum dosage of pesticide - 2 mg/kg of fodder corresponds to the maximum permissible level (MDU) of dichloropropaphos in fodders for adult Karakul sheep.

Vaccination of experimental lambs was carried out simultaneously with the onset of chronic exposure to pesticide and after daily administration to animals for 14 days.

The general toxic effect of dichloropropaphos on experimental lambs was evaluated on the basis of a complex of indices, among which the main activity of the enzyme system of blood acetylcholinesterase was. It has been established that daily introduction of dichloropropaphos lambs into the body in a dose of multiple of 10 MDU already on day 14 caused them to develop chronic intoxication. Prolonged daily exposure to dichloropropaphos at a dose of 1/500 ЛД50 for 1.5 months. (MDU) caused the test lambs to have a condition characteristic of starting a toxic process under the influence of said pesticide.

The colibacteriosis vaccine did not have a negative effect on the body of the test animals. A more detailed description of morphological and biochemical changes in the blood of these lambs is presented in earlier published articles [6,7,8,9]. The results of the study of quantitative changes in the population composition of T- and B-lymphocytes of peripheral blood of test lambs are characterized by the following changes.

Daily, within 14 days, administration to test lambs of the first group of 1/50 ЛД50 dichloropropaphos significantly reduced only the relative number of E-rosette lymphocytes by 16% ($P < 0.05$) compared to the control.

The dynamics of quantitative changes and functional state of immunocompetent cells and HST - positive neurofils of peripheral blood of test lambs of this group after immunization with colibacteriosis vaccine was characterized by the absence of significant disorders on the part of E-rosette cell population compared to control. At the same time, the relative and absolute content of EAC-derived lymphocytes decreased and the minimum number was detected 28 days after vaccination, which was 29 and 42% lower ($P < 0.05$) respectively than the level of EAC cells in peripheral blood of intact, vaccinated lambs (fifth group). A statistically significant 44% reduction in the percentage of for mazanpositive blood of

neutrophils ($P < 0.05$) should be noted, but by the end of the experiments (in 1.5 months), this indicator of the first group of test lambs was not significantly different from the same control animals.

In peripheral blood of test lambs of the second group vaccinated simultaneously with the onset of chronic exposure to dichloropropaphosae at a dose of 1/50 ЛД50, after 14 days statistically significant reduction of relative and absolute content of EAS-rosette lymphocytes, respectively by 30% and by 2 times ($P < 0.05$), compared to control, was found.

A statistically significant 23% reduction ($P < 0.05$) in the relative and absolute T-lymphocyte content was observed on day 21 of the post-regulatory period. The relative number of B lymphocytes decreased by 29% ($P < 0.05$) and absolute by 53% ($P < 0.05$), compared to the level of these immunocompetent cells in the blood of intact, vaccinated lambs of the fifth group.

By the time of testing the protective properties of the colibacteriosis vaccine (in 1.5 months of experiments), there were no significant differences between the T- and B-lymphocyte content and the functional state of the HST-positive neutrophils in the blood of the test lambs of the second group compared to the control. The following is also the dynamics of changes in the content and functional state of immunocompetent cells after experimental infection of experimental lambs of the second group with daily escherichia culture at a dose of ЛД100 (15 billion/ml), which shows that with the exception of a short-term decrease in the relative T-lymphocyte content by 25% ($P < 0.05$) and the percentage of HCT-positive neutrophils by 24% ($P < 0.05$), other.

Therefore, chronic intoxication of animals with dichloropropaphos has a negative effect on the functional state of the immunocompetent cells of their peripheral blood. Most dichloropropaphos affect B lymphocyte populations.

In the test lambs of the third group, who were given dichloropropaphos daily at a dose of 1/500 ЛД50 14 days before vaccination, a statistically significant reduction of 26% ($P < 0.05$) in the relative number of T-lymphocytes was found by the time of immunization. The absolute number of these cells tended to decrease by 32% ($P < 0.1$). The tendency to decrease by 26% ($P < 0.1$) was also the relative number of EAC-rosetted peripheral blood lymphocytes of these animals.

14 days after vaccination of the lambs of the third group and subsequent introduction of the pesticide into their body at a dose of 1/500 ЛД50, there was a significant decrease of 18% ($P < 0.05$) in the relative content of B- lymphocytes and 28% ($P < 0.05$) in their absolute amount compared to the control. The

functional state of formazanpositive neutrophils in test animals of the third group was 48% lower ($P < 0.05$) than in intact lambs of the fifth group.

28 days after vaccination, the relative and absolute content of B-lymphocytes in the peripheral blood of the test lambs of the third group was 30% and 46% ($P < 0.05$), respectively, less than these values of intact animals. However, at the time of testing the protective properties of the colibacteriosis vaccine, the T- and B- lymphocyte content as well as the percentage of HCT-positive neutrophils in the priferic blood of the test lambs of the third group were the same as in the control animals.

The dynamics of changes in the quantitative content and functional state of immunocompetent cells in the blood of lambs of the third group, subjected to infection with escherichies at the dose ЛД100 did not differ significantly from the similar control lambs.

In the study of quantitative changes in the population composition of T- and B- lymphocytes and the functional state of formazanpositive neutrophils of peripheral blood of test lambs of the fourth group (with simultaneous vaccination and chronic, for 1.5 months, exposure to dichloropropaphosae at a dose of 1/500 LD50), significant differences compared to intact, vaccinated animals, have not been established.

The same results were obtained by studying the dynamics of changes of immunocompetent blood cells of lambs of this group after experimental infection with Escherichia culture at the dose of ЛД100.

Consequently, pre-exposure of animals to dichloropropaphos even in doses at the level of its MDU in foods has a negative effect on the functional state of the immunocompetent

REFERENCES

1) *Rockers G.F., Solodovnikov V.L. Determination of populations of blood lymphocytes of cattle by method of rosette formation.: Method. Recommendations on biochemical methods of research of cells, their components and other biological substrates. - M.: ВАСХНИЛ.,1980.-С.28- 34.*
2) *Melnikov N. N. Pesticides and plant growth regulators. Справ., - М.-1995*
3) *Belan S.R. Pesticides and Plant Growth Regulators. Entsiklop.sprav., - M.2001*
4) *Shubich M.G., Mednikov V.G. NST - test in children in normal and in case of purulent-bacterial infections.//Lab. Business.-1978. - No. 9. - With 515-517.*
5) *Haitov V.R. Comparative evaluation of toxicity of pesticides - derivatives of thio- and dithiophosphoric acid esters: Autoref. the yew ... vt the Dr. Moscow, 1989. -33 p.*
6) *Sadykov I.S. Functional state of some factors of non-specific protection and immunological reactivity of animals poisoned with tokuthion. - Scientific bulletin БГУ.,2011/4 (44) .С.84 -86*
7) *Sadykov I.S. Hygienic characteristic of some organophosphorus compounds used in insect control. Collecting. Науч. Works of BGMI., Bukhara 2011. Page 143-145.*
8) *Sadykov I.S. Distribution and accumulation of tokuthion in the body in case of acute pesticide poisoning., Journal "Tingbo.," Tashkent., 2014.-№ 2.- С.49-52*
9) *Sadikov. I.Sh. Cellular and hum oral immunity factors of animals vaccinated against the background of acute poisoning with dichlorpropaphosomes. Asian Journal of Multidimensional Research., December., 2019., 94- 98.*

Design and Development of Tumbling Machine

Atharva Suresh Thorat [1], Shubham Subhash Hulavale [2], Amol Balaji Pawar [3], Pratik Nandkishor Jadhav[4], Prof. V. S. Dixit[5]

[1]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[2]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[3]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[4]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[5]Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

ABSTRACT

Every good manufactured in an industry is passing through different processes. Finally a product is salable in market if finishing carried out over the product is effective. For small products it is very difficult to provide finishing with human and hence a machine is necessary to smooth finish a product. Finishing not only provides better look to the product but it also processes the product through removal of rust and polishing of product. Authors have designed and developed the tumbling machine for finishing of the small products in mechanical manufacturing companies. The detail calculations of design and model developed in CAD is presented in this paper.

KEYWORDS: Tumbling, Tumbling Machine, finishing, smoothening, CAD.

INTRODUCTION:

A finished product had been always appreciated by the customer than the one without proper finishing. The process deals with removal of unwanted pieces, sharp edges and other corners those are hazardous for safe use of any product. Tumbling is very important process as any product is finally ready after finishing it. The process of finishing the products by removing the hard corners and other unwanted minute pieces of material is very important.

When those processes are completed by human being it is very difficult to complete it with accuracy level needed for the products. The machine is needed to carry out this task in manufacturing cycle. Cost of such machines should be less so that every small scale industry can purchase it and utilize it to improve the quality of product. Authors have designed the tumbling machine for Indian industries where the products need to be manufactured at low cost with high precision.

SYSTEM REQUIREMENT:

Table.1: Details of main components

Sr. No.	Component Details	Picture of Purchased Component
1	Shaft carbon steel of grades 40C8, 45C8, 50C4 and 50C12	
2	Media (Abrasive Material)	
3	Bearing (Ball)	
4	Spring spring rate 10 N/mm	
5	Vibrating Motor 1HP, Single Phase, 3000 RPM, 220V	
6	MS Base (Rigid frame)	

OBJECTIVES OF WORK:

The work is carried out with following objectives accomplishment.

- Designing the tumbling machine for small industries in India.
- Developing the machine for goods finishing.
- Using the machine for product finishing in industries.

SYSTEM DESIGN:

Design of Shaft

The following is the design procedure for shaft P=20KW

N=400RPM

Shock factor (Kb)= 1.25 Fatigue factor (Ka) = 1.5

Ultimate tensile stress = 400 Nmm^2

Yield tensile stress = 240 Nmm^2

Pulley is apart 500 mm

Step 1: Applying ASME code to find Ƭ permissible Ƭper=0.3 × Syt = 0.3 × 240 = 72 Nmm^2

Ƭper=0.18 × Sut=0.18 × 400 = 72 Nmm^2

Pulley are key to shaft reducing smaller values by 25 % Ƭper = 0.75 × 72 = 54 Nmm^2

Ƭper = 54 Nmm^2

Step 2: Calculate Torque Transmitted

P=2nNT60 T=P×602nN

=20×10^3×602×n×400 T= 477464.829 N-mm

Torque is transmitted by belt drive Torque= (T1-T2)×R 47746.829=(T1-T2)×150

(T1-T2) =3183.09886 Also T1T2=2.5

(2.5T2-T2) =3183.09886 T2=2122.065907 N-mm

T1=5305.1647 N-mm

Shear force calculations

Ma=0 7427.2306×500−Rb×600=0

Rb=6189.35883 N-mm

Ra=1237.87177 N-mm

Step 3: Bending moment calculations

Bm at A=0

Bm at B=0

Bm at C= 6189.35883×500

C=1594679.415 N-mm

Step 4: To find diameter of shaft

√ (Ka×T)2+(Kb×M)2=n16×d3×veer D=50.49 mm

Diameter if solid shaft is 50 mm

Design of Ball Bearing

The following is the Procedure of Ball Bearing

Type of Bearing = Single Row deep groove Ball Bearing Pmax=1500 N

N= 720 rpm

Step 1: Equivalent Dynamic Radial Load Pe= [1N ∫ P3.dN]21

=[12n ∫ P3Nax.(1−cos8)^38d8]^132n0 After solving the above equation

= PNax2[52]^13

= 15002×[52]^13

Pe= 1017.9066 N

Step 2: Basic Dynamic load capacity

L10 = [CPe]^a

345.6 = [C1017.91]^3

C= 7143.3285 N

The dynamic load capacity in bearing is 7143.3285.

Calculation of the Life of Bearing

In shaft use deep groove ball bearing, to find life of bearing most be determine ideal load -P- by radial factor X- thrust factor-Y- radial load-Pr- and thrust load-Pa when. [X=1, Y=0] not axial load.

1- Find Life of Bearing (A)

$Pr = \_/\overline{\ }((FAv)^2 + (FAh)^2 (26))$

$Pr = = \_/\overline{\ }((73.6)^2 + (63139.555)^2)$ Pr = 63139.598N

P = X. Pr + Y.Pa (27)

P = 1 ∗ 63139.598+ Y ∗ 0,

P = 63139.589N

To find life of bearing (A) use ideal load (P=63139.589N) speed factor (Fn=0.41) and temperature factor (Ft=1) and load capacity of bearing (C=405000N)

Fl = Fn. Ft. C/P (28) Fl = 0.41 * 1 * (405000)/63139.589,

Fl = 2.62 Lh = 8000h = operational hour 2- Find Life of Bearing (B)

Pr = = _/‾ ((FBv)2 + (FBh)2),

Pr = = _/‾ ((73.6)2 + (61467.582)2) Pr = 61467.626N,

P = X. Pr+ Y. Pa P = 1 * 61467.626+ Y * 0, P = 61467.626N

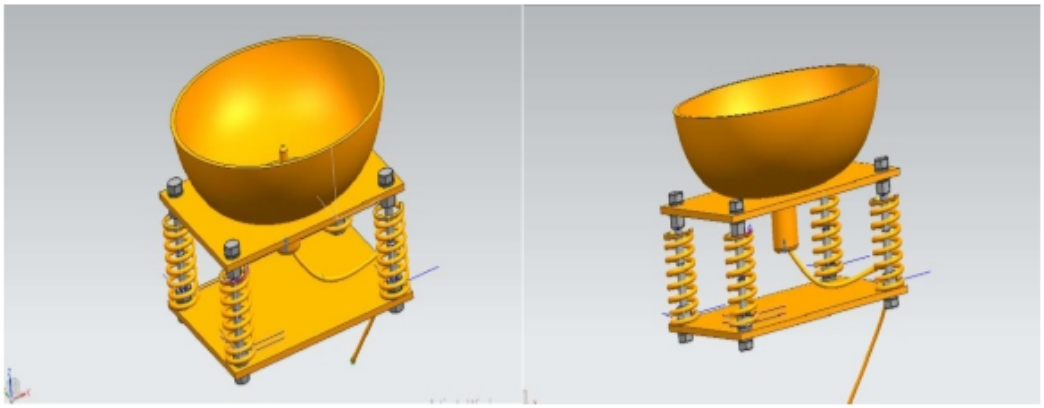
To find life of bearing (B) use ideal load (P=61467.626N) speed factor (Fn=0.41) and temperature factor (Ft=1) and load capacity of bearing (C=405000N) from table (4.1)

Fl = Fn. Ft. C/P

Fl = 0.41 1 (405000)/61467.626 ,

Fl = 2.7 Lh = 8500h = operational hour

CAD MODEL DEVELOPED:



SIDE VIEWS

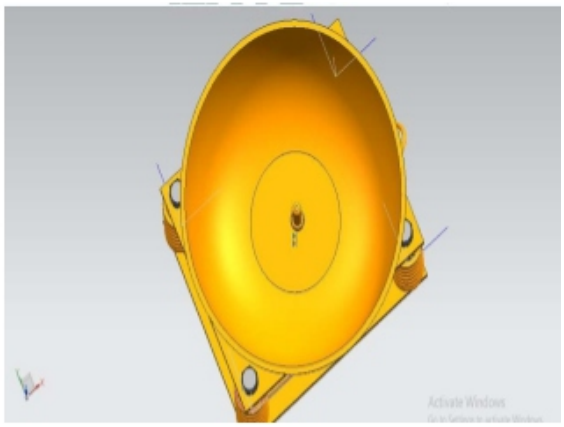


Fig.1: Various views of Tumbling Machine Designed in CAD

FUTURE SCOPE:

The machines must be developed at large scale for Indian industries to carry out finishing task of product. The design is validated and found suitable for production of machine. This is a basic model of such machines where mechanical components are connected. In future interfacing of such machines with computers and control of operation with freeware's like Arduino is possible. The control of operations with different types of products is possible in same machine with interfacing of microcontroller.

CONCLUSION:

The machine for tumbling operation of product needs to be designed with cost consideration from perspective of small workshops in India. Authors have designed the tumbling machine with effective solution with respect to cost consideration. The machine is capable of carrying out the operations in tumbling process where a raw product is converted to final finished good. This is specially designed to handle the small products in large number. A cost effective machine designed specifically for the surface finishing of the components for use in particular applications was developed. It is efficient, cost effective, simple to use and cheap to maintain. These features make it particularly suitable for the informal sector where there is little or no technical knowledge. Its cost effectiveness when compared to existing machinery also makes it competitive. It removes the restrictions posed to recycling by the high cost of existing machinery, consequently increasing recycling activities.

REFERENCES:

1) *Hashimoto, Fukuo, and Stephen P. Johnson. "Modeling of vibratory finishing machines." CIRP Annals 64.1 (2015): 345-348.*
2) *Griffin, T. "Vibratory cleaning, descaling, and deburring of stainless steel parts." Cleaning Stainless Steel. ASTM International, 1973.*
3) *Xinhao, D. U. A. N., and Z. H. A. N. G. Chunhua. "Analysis on Current Technical Status and Development of Tumbler Screening Machines in China and Abroad." Applied Mechanics & Materials 743 (2014).*
4) *Wang, Yanmin, and Eric Forssberg. "Enhancement of energy efficiency for mechanical production of fine and ultra-fine particles in comminution." China Particuology 5.3 (2007): 193-201.*
5) *Shi, Fengnian, et al. "Development of a rapid particle breakage characterisation device–The JKRBT." Minerals Engineering 22.7-8 (2009): 602-612.*
6) *SMITH, JEFFREY S., et al. "Process plan generation for sheet metal parts using an integrated feature- based expert system approach." THE INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH 30.5 (1992): 1175-1190.*
7) *Domblesky, J., V. Cariapa, and R. Evans. "Investigation of vibratory bowl finishing." International journal of production research 41.16 (2003): 3943-3953.*
8) *Sofronas, A., and S. Taraman. "Model development and optimization of vibratory finishing process." International journal of production research 17.1 (1979): 23-31.*
9) *Hashimoto, Fukuo, and Daniel B. DeBra. "Modelling and optimization of vibratory finishing process." CIRP annals 45.1 (1996): 303-306.*
10) *Kang, Young Sup, et al. "Discrete element modeling of 3D media motion in vibratory finishing process." CIRP Annals 66.1 (2017): 313-316.*

Overview of Fixture Design for Industry

Vaibhav Vinayak Bhosale [1], Abhijeet Rajendra Mekha[2], Vaibhav Vijaykumar Matol [3], Anil Achyutrao Kale[4], Prof. Sanket S Chikshe[5]

[1]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, India

[2]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, India

[3]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, India

[4]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, India

[5]Asst. Prof. Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Talegaon, Pune,

ABSTRACT

Mechanical industries are grown at the rate of 5% in last decade and which is supposed to grow in future at faster rate with the supporting policies of Indian government such as make in India. The mechanical industries are acting as the backbone of all sectors as without mechanical industries it is highly impossible to manufacture any product at large scale. Many operations in mechanical industries need to work on the piece of materials. For the operations such as cutting, shaping, turning and many more, fixtures are used so that the piece of material will be fixed at a place in order to complete operations with precision. Fixture is one of the basic elements in mechanical operations of industry for converting the raw material to product.

KEYWORDS: Pneumatic Cylinders, Direction Control Valve, Solenoid Valve.

INTRODUCTION:

Fixture is the most important equipment used in mechanical industries to hold, locate and support the work piece during the operation. The purpose of the project is to reduce the human effort. This project has been selected as an issue of safety and failure of worker in an industry. The completion of this project will drastically reduce fatigue of the worker and also provide safe working conditions to worker. The fixture needs the electro mechanical components to operate. The operating parts include valves to control direction, movements, cylinders to control pressure etc.

The product development process should be very fast and bendable with the minimum scope for any accident during operations. The mechanical parts are processed to give them a final shape of product with mechanical operations. These operations will be performed with more precision if a structure to fix the piece of material is used. Fixtures plays important role in production of mechanical parts with effective performance of operations on it.

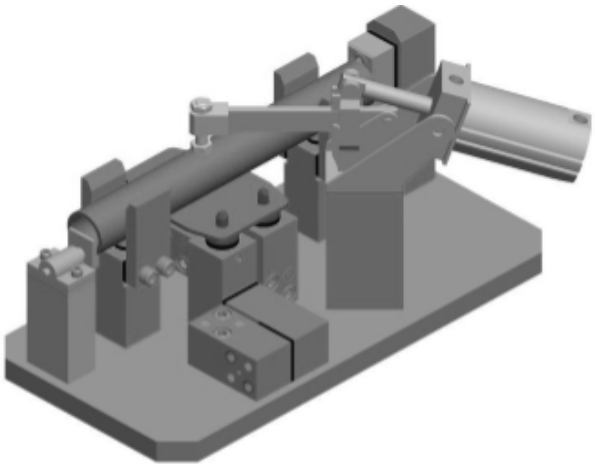


Fig.1: Basic structure of Fixture

The mechanical industries have grown over last 25 years at faster rate all over the world with the development of applications of physics. Even though electronics industries and software industries are growing much faster that mechanical, still the manufacturing operations are mainly mechanical for most of the products. Figure drawn above shows basic structure of fixture used in mechanical industry.

PROCESS OF FIXTURE DESIGN:

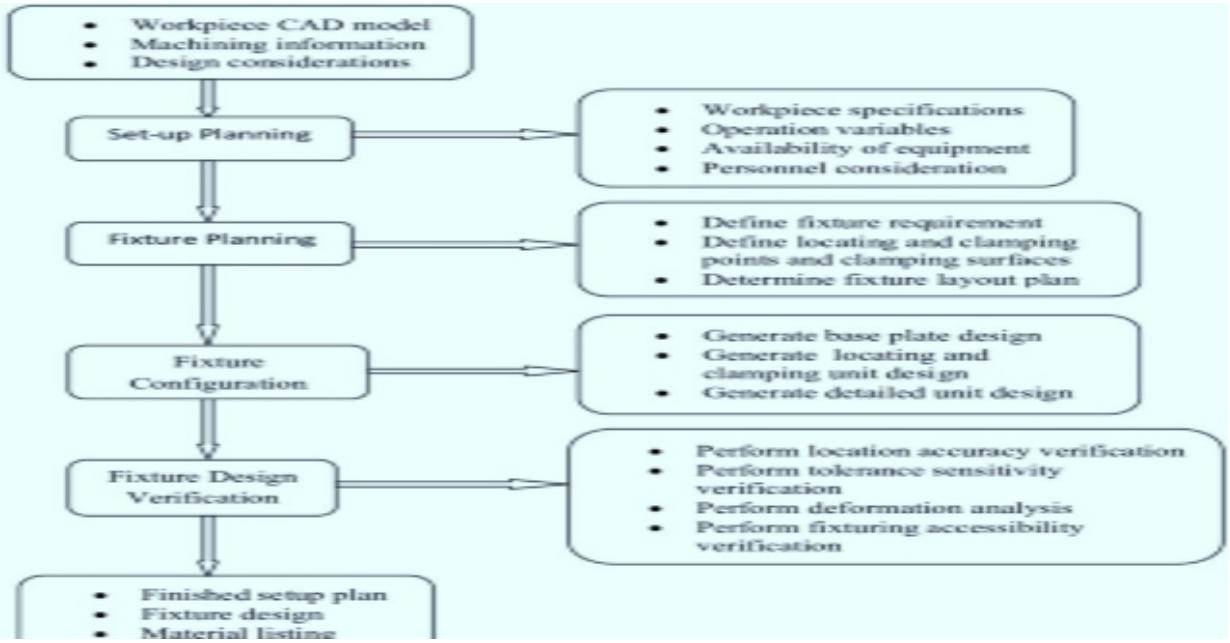


Fig.2: Process of Fixture Design

The flowchart for the process of designing a fixture is shown in above figure. In the first stage of developing a fixture availability of the equipment's for developing a structure with objectives of design are considered. In next stage requirements such as place, purpose and layout of fixture are studied and considered for manufacturing. Then the design is verified for accuracy of operation performance. Finally it is manufactured and set up. The general steps for fixture design can be stated as follows.

1) Defining requirements.

2) Gathering Information.

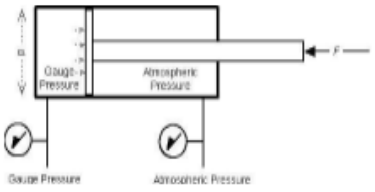
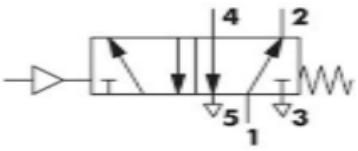
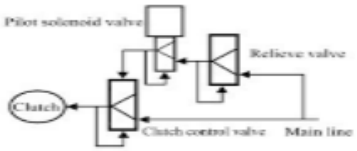
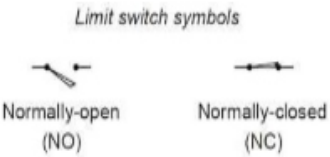
3) Developing Options.

4) Choosing best Option.

5) Implementing the Design

COMPONENTS USED IN FIXTURE:

Table.1: Main Components of Fixture

Sr. No.	Component Details	Purpose	Picture of Component
1	Cylinder	Pneumatic cylinder is used to carry out the task with force developed	
2	Direction Control Valve	It is used to change the direction of force to be applied.	
3	Solenoid Valve	It converts electrical energy to mechanical movement	
4	Limit Switches	It operates as a safety interlock to cout passing point of object.	

CONCLUSION:

Fixture is very important to be used in mechanical industries. Many operations such as tuning, grinding, and shaping are carried out on small piece of material. In these operations high accuracy is expected for final finishing of product. If the operations are not carried out with precision, then the product may be rejected by the quality engineer. At the same time, if the material is not fixed at a place, the worker operating the machine has high chances of accidents. As most of the operations on mechanical parts are

operating with rotating machines and other tools, there are chances of occurrence of accident. Authors have presented the overview of manufacturing process for fixture. The steps for manufacturing of fixture are discussed in this paper.

REFERENCES:

1) *Wang, Hui, et al. "Computer aided fixture design: recent research and trends." Computer-Aided Design 42.12 (2010): 1085-1094.*
2) *Kang, Y., Y. Rong, and J. C. Yang. "Computer-aided fixture design verification. Part 1. The framework and modelling." The International Journal of Advanced Manufacturing Technology 21.10- 11 (2003): 827-835.*
3) *Bi, Z. M., and W. J. Zhang. "Flexible fixture design and automation: review, issues and future directions." International Journal of Production Research 39.13 (2001): 2867-2894.*
4) *Boyle, Iain, Yiming Rong, and David C. Brown. "A review and analysis of current computer-aided fixture design approaches." Robotics and Computer-Integrated Manufacturing 27.1 (2011): 1-12.*
5) *Wentink, Chantal, et al. "Algorithms for fixture design." Algorithms for Robotic Motion and Manipulation (1997): 321-346.*
6) *C.C.Handa, H. A. (2016). A Real Time Design and Development of Fixture for Unloading of Control Assembly in an Industry. International Journal for Scientific Research & Development (IJSRD), 3(11), 3.*
7) *Prof. A. A. Karad, B. W. (2016, March-April). A Review on Design Consideration and Need of Fixture in Manufacturing Industries. International Journal of Engineering Research and General Science , 4(2), 5.*

ACKNOWLEDGEMENT:

We would like to thank respected principal Dr. Thaksan Pravat, HOD Prof. Ravindra Daspute and project guide Prof. Sanket Chikshe for giving us such a wonderful opportunity to expand our knowledge from our own branch and giving us guidelines to present a research paper. This study is supported by Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune.

Design and Development of Digital Fuel Level Indicator for 2 Wheeler Splender Vehicle

Pratik Manu Chikane [1], Nikhil Sanjay Dalvi[2], Rajkumar Dayanand Rathod [3], Mankesh Ajay Bhagat[4], Prof. Nilam R. Karpe[5]

[1]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S.,India

[2]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S.,India

[3]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[4]Student, Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

[5]Department of Mechanical Engineering, Dr. D.Y. Patil College of Engineering and Innovation, Varale, Pune, M.S., India

ABSTRACT

Automobile is one of the largest growing sectors in India. The number of vehicles is increasing on Indian roads every day. Around 2025 India will be third largest manufacturer of automobile in the world. There are around 190 million two wheelers running on Indian road and consuming the huge amount of petrol every day. The two wheelers are available with the lock system for petrol knob. The problems with the mechanical knobs are leakage and theft of petrol. While sometimes the petrol vending pumps are not properly calibrated which leads to loss of money to the customer. Authors have developed the fuel indicator for two wheelers using Arduino. The fuel indicator system will be capable of sensing the amount of fuel poured in tank and how much is consumed using the flow sensors and level indicator.

KEYWORDS: Flow sensor, Arduino, Two Wheeler, LCD Display, Level Indicator, etc.

INTRODUCTION:

The present fuel indicator systems in two wheelers are mainly based on analog strip or the capacitive sensors. The Arduino being open hardware is very popular for various applications. The fuel like petrol is very important factor for developing economies like India.

The cost of petrol is varying almost every day as major sources are out of India. The frauds happening at petrol pumps are registered several times. There are several complaints registered against the petrol pump owners for such cases. On the other hand, the theft of the petrol from the tank of the bike often happens and not registered as a serious crime as its market values is small.

The analog displays are showing the level of fuel in tank but the owner of bike will never get exact idea about how much fuel is available in tank. The digital system will be effective to display amount of fuel present in tank with use of sensors for precision in readings. Following figure shows the block diagram for fuel level display.

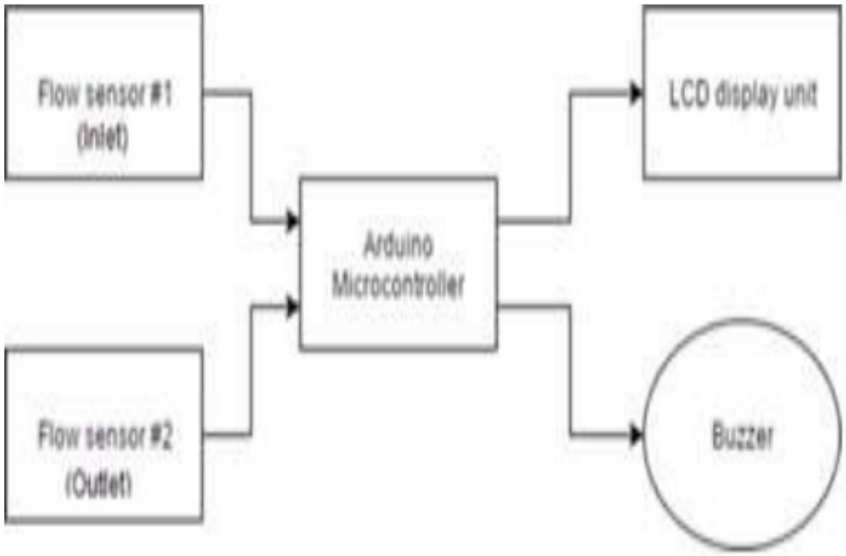


Fig.1: Block diagram

The flow sensors for inlet and outlet identify the fuel coming in and going out of tank. The LCD display connected to the Arduino display the amount of fuel available in tank. The buzzer is used to alarm if the level of fuel goes below specified limit or if someone is stealing the fuel from tank. The display for indicator is shown in figure below.

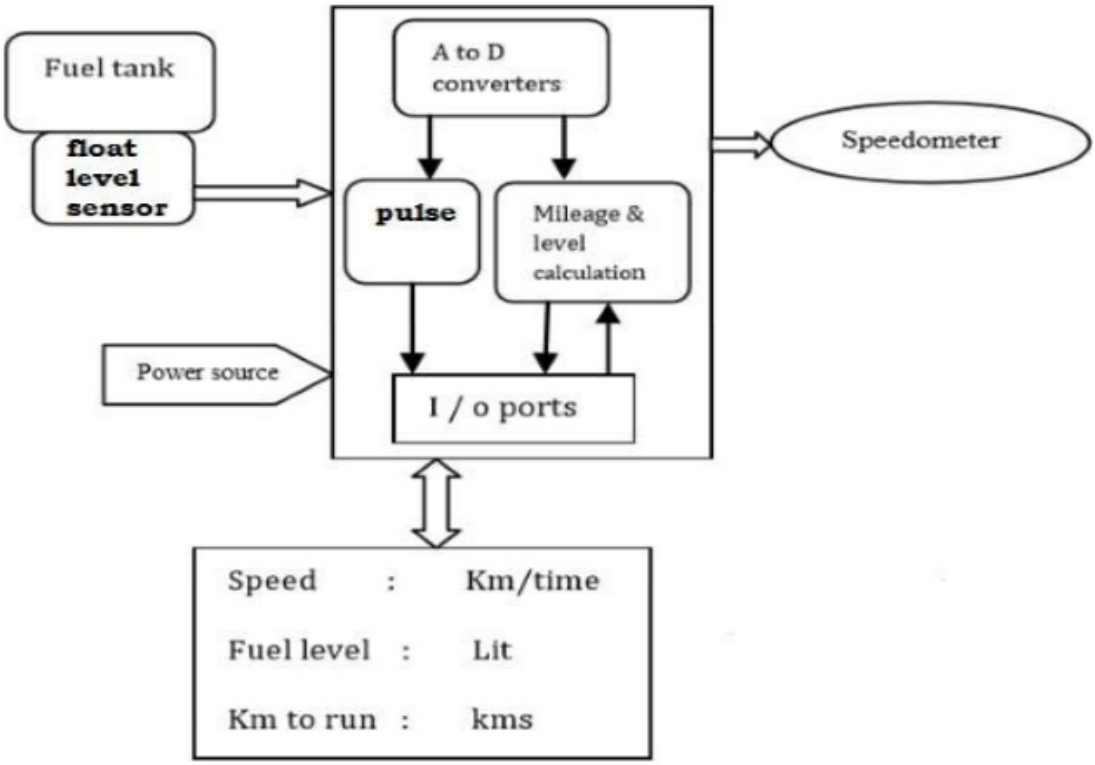


Fig.2: Digital Fuel Indicator Display

MOTIVATION OF WORK:

The numbers of vehicles registered in India are increasing every year since last decade. The theft of petrol and cheating at the petrol pumps in measuring the petrol with proper precision has registered several times in India. To overcome this problem authors have decided to develop the low cost system so that anyone can replace the existing system of two wheelers.

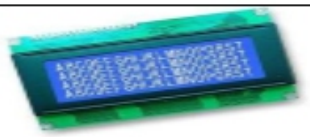
OBJECTIVES OF WORK:

Objectives of the work carried out are as below:

- Design the fuel detection system for two wheelers.
- Develop the system to avoid the theft of petrol using Arduino based system.
- Design the system in software environment.

SYSTEM REQUIREMENT:

Table.1: Specifications of main components

Sr. No.	Component Details	Photo of Purchased Component
1	**Float level sensor:** 10W, 0.5 A, 5V	
2	**Arduino Uno Atmega 328P:** Output 5Volts, Input 7 to 20Volts, 14Pins, Flash Memory 32KB	
3	**16×2 LCD Display:** 5x8 dots , 5 Volts	
4	**Flow Sensor:** 4.5Volts,15mAmp	

SYSTEM DESIGN:

The system is designed in ANSYS software to realize the modifications in tank of the bike as below:

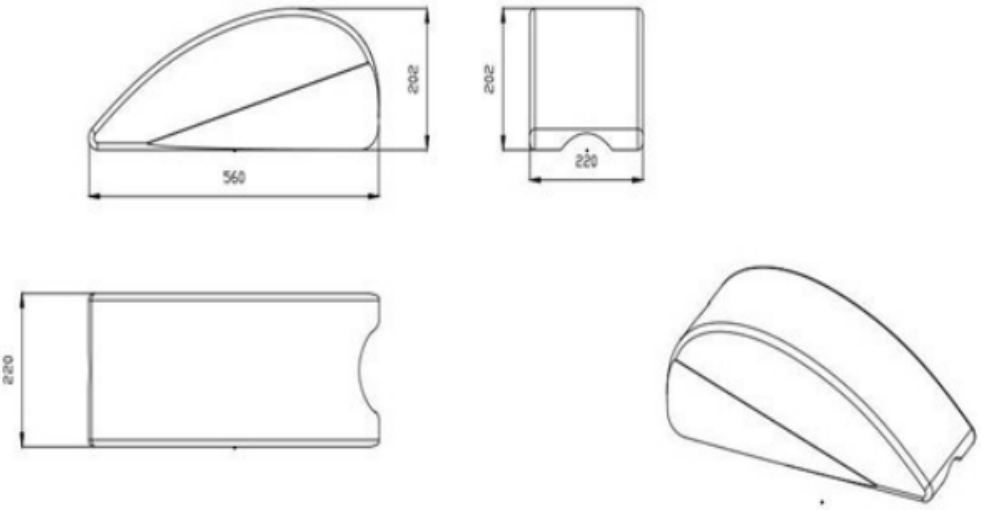


Fig.3: Various views of the fuel tank of two wheeler

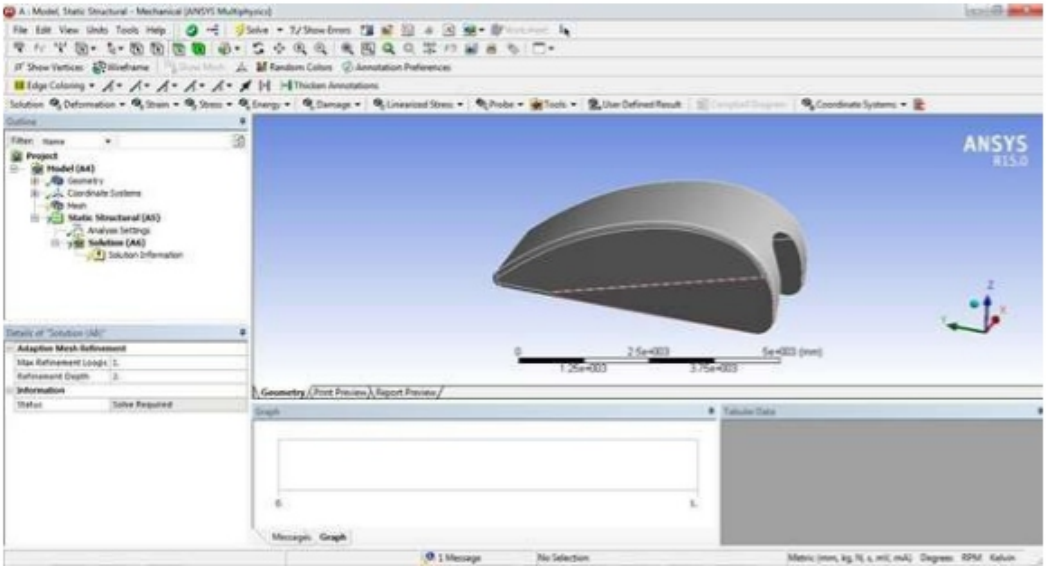


Fig.4: 3D view-1 of the fuel tank of two wheeler developed in ANSYS

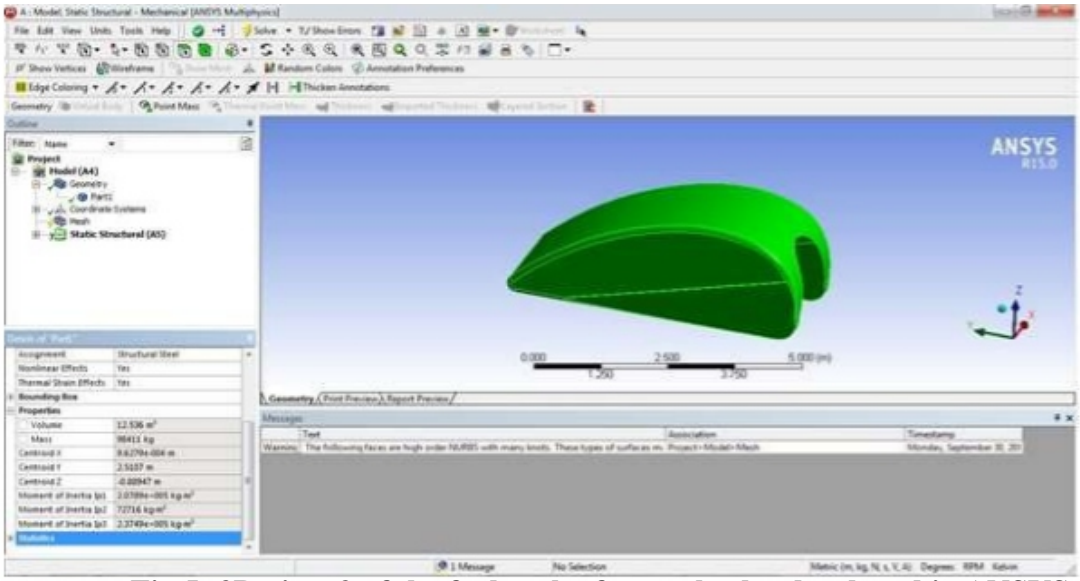


Fig.5: 3D view-2 of the fuel tank of two-wheeler developed in ANSYS

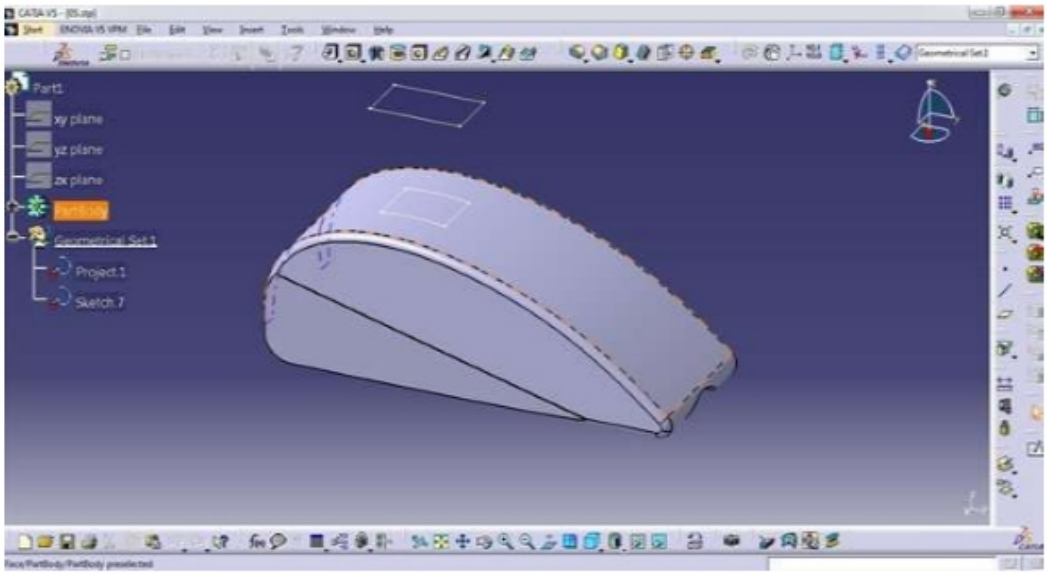


Fig.6: 3D view-3 of the fuel tank of two-wheeler developed in ANSYS

The amount of fuel added to the tank is calculated as-

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$$

$$L = \frac{W - I}{0.7372199} \text{ (Lit.)}$$

CONCLUSION:

As the number of vehicles increases, petrol theft becomes very serious problem. Total 65% of total petrol is consumed by two wheelers in India. The theft of petrol is often observed in many parking's. Some of the cases are also registered against the owners of petrol pumps for improper calibration of the petrol injecting pumps. The Arduino application for detection of the petrol in fuel tank of two wheelers will be useful to avoid the theft detection of fuel. The system is cost effective and useful for all the two wheelers in India. As the system is Arduino based the supply of the petrol to the engine can be stopped in case of theft of the vehicle.

REFERENCES:

1) *Akshay, T. S., et al. "Design and Fabrication of Automated Re Fuelling System for Automobiles with Real-Time GPS Alerts." (2019).*
2) *Goswami, Tanmoy. "True-Fill: A Prototype to Know Actual Fuel Filled at Petrol Pump Using Sensors for Common Indians." Research into Design for a Connected World. Springer, Singapore, 2019. 585- 592.*
3) *Qadeer, Shaik A., et al. "High resolution fuel indicating and tracking system." Microsystem Technologies 25.6 (2019): 2267-2271.*
4) *IRAIMATHIVANAN, P., GOWTHAM, R., HARIHARAN, S., & RAVEENDRAN, D. P. S. (2019). Petrol Theft Preventer.*
5) *Spinola, Eduardo JN, Filipe ES Santos, and J. Dionísio S. Barros. "Electronic Automotive Control." 2019 5th Experiment International Conference (exp. at'19). IEEE, 2019.*

6) *Hussain, Syed Saiq, et al. "Sensor-less Control of a BLDC Motor for the Conversion of a Conventional Petrol Vehicle into a Solar-Electric Powered Vehicle." 2019 13th International Conference on Mathematics, Actuarial Science, Computer Science and Statistics (MACS). IEEE, 2019.*
7) *Kambli, Mansi, et al. "BikeBeat: An Implementation of an Android Application using Real Time Data from a Motorcycle using Arduino Microcontroller and Bluetooth." International Journal of Engineering Science 10945 (2017).*
8) *Ramya, S., et al. "Digital Fuel Level Indicator Using Atmega328 Microcontroller." Research & Reviews: A Journal of Embedded System & Applications 7.2 (2019): 15-22.*
9) *Patel, Raj, Hitesh Pungalia, and Saurabh Mahajan. "Flow meter and arduino based fuel gauge for automotive vehicles." IOSR Journal of Mechanical and Civil Engineering 13.5 (2016): 85-92.*
10) *ANURADHA, B., et al. "Fuel Level Indication and Mileage Calculator Using Iot." 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS). IEEE, 2019.*

Instructions for Authors

Essentials for Publishing in this Journal

1 Submitted articles should not have been previously published or be currently under consideration for publication elsewhere.

2 Conference papers may only be submitted if the paper has been completely re-written (taken to mean more than 50%) and the author has cleared any necessary permission with the copyright owner if it has been previously copyrighted.

3 All our articles are refereed through a double-blind process.

4 All authors must declare they have read and agreed to the content of the submitted article and must sign a declaration correspond to the originality of the article.

Submission Process

All articles for this journal must be submitted using our online submissions system. http://enrichedpub.com/ . Please use the Submit Your Article link in the Author Service area.

Manuscript Guidelines

The instructions to authors about the article preparation for publication in the Manuscripts are submitted online, through the e-Ur (Electronic editing) system, developed by **Enriched Publications Pvt. Ltd**. The article should contain the abstract with keywords, introduction, body, conclusion, references and the summary in English language (without heading and subheading enumeration). The article length should not exceed 16 pages of A4 paper format.

Title

The title should be informative. It is in both Journal's and author's best interest to use terms suitable. For indexing and word search. If there are no such terms in the title, the author is strongly advised to add a subtitle. The title should be given in English as well. The titles precede the abstract and the summary in an appropriate language.

Letterhead Title

The letterhead title is given at a top of each page for easier identification of article copies in an Electronic form in particular. It contains the author's surname and first name initial .article title, journal title and collation (year, volume, and issue, first and last page). The journal and article titles can be given in a shortened form.

Author's Name

Full name(s) of author(s) should be used. It is advisable to give the middle initial. Names are given in their original form.

Contact Details

The postal address or the e-mail address of the author (usually of the first one if there are more Authors) is given in the footnote at the bottom of the first page.

Type of Articles

Classification of articles is a duty of the editorial staff and is of special importance. Referees and the members of the editorial staff, or section editors, can propose a category, but the editor-in-chief has the sole responsibility for their classification. Journal articles are classified as follows:

Scientific articles:

1. Original scientific paper (giving the previously unpublished results of the author's own research based on management methods).
2. Survey paper (giving an original, detailed and critical view of a research problem or an area to which the author has made a contribution visible through his self-citation);
3. Short or preliminary communication (original management paper of full format but of a smaller extent or of a preliminary character);
4. Scientific critique or forum (discussion on a particular scientific topic, based exclusively on management argumentation) and commentaries. Exceptionally, in particular areas, a scientific paper in the Journal can be in a form of a monograph or a critical edition of scientific data (historical, archival, lexicographic, bibliographic, data survey, etc.) which were unknown or hardly accessible for scientific research.

Professional articles:

1. Professional paper (contribution offering experience useful for improvement of professional practice but not necessarily based on scientific methods);
2. Informative contribution (editorial, commentary, etc.);
3. Review (of a book, software, case study, scientific event, etc.)

Language

The article should be in English. The grammar and style of the article should be of good quality. The systematized text should be without abbreviations (except standard ones). All measurements must be in SI units. The sequence of formulae is denoted in Arabic numerals in parentheses on the right-hand side.

Abstract and Summary

An abstract is a concise informative presentation of the article content for fast and accurate Evaluation of its relevance. It is both in the Editorial Office's and the author's best interest for an abstract to contain terms often used for indexing and article search. The abstract describes the purpose of the study and the methods, outlines the findings and state the conclusions. A 100- to 250-Word abstract should be placed between the title and the keywords with the body text to follow. Besides an abstract are advised to have a summary in English, at the end of the article, after the Reference list. The summary should be structured and long up to 1/10 of the article length (it is more extensive than the abstract).

Keywords

Keywords are terms or phrases showing adequately the article content for indexing and search purposes. They should be allocated heaving in mind widely accepted international sources (index, dictionary or thesaurus), such as the Web of Science keyword list for science in general. The higher their usage frequency is the better. Up to 10 keywords immediately follow the abstract and the summary, in respective languages.

Acknowledgements

The name and the number of the project or programmed within which the article was realized is given in a separate note at the bottom of the first page together with the name of the institution which financially supported the project or programmed.

Tables and Illustrations

All the captions should be in the original language as well as in English, together with the texts in illustrations if possible. Tables are typed in the same style as the text and are denoted by numerals at the top. Photographs and drawings, placed appropriately in the text, should be clear, precise and suitable for reproduction. Drawings should be created in Word or Corel.

Citation in the Text

Citation in the text must be uniform. When citing references in the text, use the reference number set in square brackets from the Reference list at the end of the article.

Footnotes

Footnotes are given at the bottom of the page with the text they refer to. They can contain less relevant details, additional explanations or used sources (e.g. scientific material, manuals). They cannot replace the cited literature.
The article should be accompanied with a cover letter with the information about the author(s): surname, middle initial, first name, and citizen personal number, rank, title, e-mail address, and affiliation address, home address including municipality, phone number in the office and at home (or a mobile phone number). The cover letter should state the type of the article and tell which illustrations are original and which are not.

Address of the Editorial Office:

Enriched Publications Pvt. Ltd.
S-9,IInd FLOOR, MLU POCKET,
MANISH ABHINAV PLAZA-II, ABOVE FEDERAL BANK,
PLOT NO-5, SECTOR -5, DWARKA, NEW DELHI, INDIA-110075,
PHONE: - + (91)-(11)-45525005

Note