

PROJECT REPORT
ON
“Design and Development of drive and steering mechanism of
Automatic guided vehicle

Submitted by

Bhosale Prasad (11ME45)

ChavanManoj (11ME18)

DubeyDevang (11ME19)

KoliAniket (11ME34)

In partial fulfillment for the award of the Degree

Of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

UNDER THE GUIDANCE

Of

Prof. Zia Momin



DEPARTMENT OF MECHANICAL ENGINEERING

ANJUMAN-I-ISLAM

KALSEKAR TECHNICAL CAMPUS NEW PANVEL,

NAVI MUMBAI – 410206

UNIVERSITY OF MUMBAI

ACADEMIC YEAR 2014-2015



ANJUMAN-I-ISLAM

KALSEKAR TECHNICAL CAMPUS NEW PANVEL

(Approved by AICTE, regc. By Maharashtra Govt. DTE,

Affiliated to Mumbai University)

PLOT #2&3, SECTOR 16, NEAR THANA NAKA, KHANDAGAON, NEW PANVEL, NAVI MUMBAI-410206, Tel.: +91 22 27481247/48 * Website: www.aiktc.org

CERTIFICATE

This is to certify that the project entitled

“Design and Development of drive and steering mechanism of an AGV”

Submitted by

Bhosale Prasad

Chavan Manoj

Dubuy Devang

Koli Aniket

To the Kalsekar Technical Campus, New Panvel is a record of bonafide work carried out by him under our supervision and guidance, for partial fulfillment of the requirements for the award of the Degree of Bachelor of Engineering in Mechanical Engineering as prescribed by **University Of Mumbai**, is approved.

Project guide

(Prof.Zia Momin)

Internal Examiner

External Examiner

Head of Department

(Prof.Zakir Ansari)

Principal

(Dr. Abdul Razzak Honnutagi)



ANJUMAN-I-ISLAM

KALSEKAR TECHNICAL CAMPUS NEW PANVEL

(Approved by AICTE, regd. By Maharashtra Govt. DTE,

Affiliated to Mumbai University)

PLOT #2&3, SECTOR 16, NEAR THANA NAKA, KHANDAGAON, NEW PANVEL, NAVI MUMBAI-410206, Tel.: +91 22 27481247/48 * Website: www.aikt.org

APPROVAL OF DISSERTATION

This is to certify that the thesis entitled

“Design and Development of drive and steering mechanism of an AGV”

Submitted by

Bhosale Prasad

Chavan Manoj

Dubuy Devang

Koli Aniket

In partial fulfillment of the requirements for the award of the Degree of Bachelor of Engineering in Mechanical Engineering, as prescribed by University of Mumbai approved.

(Internal Examiner)

(External Examiner)

Prof. Zia Momin _____

Date: 27/04/2015

ACKNOWLEDGEMENT

After the completion of this work, we would like to give our sincere thanks to all those who helped us to reach our goal. It's a great pleasure and moment of immense satisfaction for us to express my profound gratitude to our guide **Prof. Zia Momin** whose constant encouragement enabled us to work enthusiastically. His perpetual motivation, patience and excellent expertise in discussion during progress of the project work have benefited us to an extent, which is beyond expression.

We would also like to give our sincere thanks to **Prof. Zakir Ansari**, Head of Department and **Prof. Aslam Hirani**, Project coordinator from Department of Mechanical Engineering, Kalsekar Technical Campus, New Panvel, for their guidance, encouragement and support during a project.

I take this opportunity to give sincere thanks to **Mr. Shrivastva**, Scientific officer in "BARC, DRHR department" for all the help rendered during the course of this work and their support, motivation, guidance and appreciation.

I am thankful to **Dr. Abdul Razzak Honnutagi**, Kalsekar Technical Campus New Panvel, for providing an outstanding academic environment, also for providing the adequate facilities.

Last but not the least I would also like to thank all the staffs of Kalsekar Technical Campus (Mechanical Engineering Department) for their valuable guidance with their interest and valuable suggestions brightened us.

Bhosale Prasad
Chavan Manoj
Dubey Devang
Koli Aniket

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Bhosale Prasad
ChavanManoj
DubeyDevang
KoliAniket

Date: 27/04/2015

ABSTRACT

DEVELOPMENT OF DRIVE AND STEER MECHANISM FOR AUTONOMOUS GUIDED VEHICLE (AGV)

Autonomous Guided Vehicle or AGV is one of material handling equipment that has been widely used in most manufacturing industry today as it provides more flexibility to the systems. The basic concept of the AGV incorporates battery-powered and remotely operate vehicles with programming for path selection and positioning.

This project includes the designing for this AGV. Using software SOLID WORKS, the design of the vehicle can be done with the respect of specification needed. The drive and steering mechanism is an important system of any AGV as the navigation of the AGV is totally governed by the drive and steering mechanism.

The types of AGV, the basic concept, the classifications of the AGV and the steering mechanism that usually used in common AGV will be reviewed. Then, this project will be focusing on the mechanical design concept of the AGV which combines knowledge on parts such as the electric motor, gears, gear head, wheel, bearing, coupling of the AGV and others mechanical parts that are essential for this project.

PROBLEM DEFINATION

With the current pressures on companies to cut the costs that go into manufacturing products, companies are turning to autonomous guided vehicle systems (AGVS) to decrease the cost of labor. This reduction in labor comes from using AGVS to transport products on fork trucks, with tow trucks, or with an AGVS as the loaded vehicle instead of the conventional methods of using manned vehicles to transport these products. Drive and steering systems, route planning are two things that need to be given serious consideration when contemplating the purchase of an AGVS.

Two things that could have a major impact on the success or failure of an AGVS are the vehicle drive and steering system and guidance system which directs the vehicle along its predetermined route. To have a good understanding of drive and steering system of AGVS, one must first have a firm grasp of the AGVS's major components and the types of vehicles that are available and their function.

The DRHR (department of Remote Handling and Robotics), BARC is working on design and development of different types of AGVs.

Our industrial guide Mr. V.K. Shrivastava has assigned us a task to design and development of drive and steering mechanism for AGV's. So, this project is about to design and development of drive and steering system for AGV, which is capable to take 700kg payload at speed of 1.5m/s.

TABLE OF CONTENT

CHAPTER 1 - INTRODUCTIONERROR! BOOKMARK NOT DEFINED.

1.1 INTRODUCTION OF AGV	ERROR! BOOKMARK NOT DEFINED.
1.1 TYPES OF AGV	ERROR! BOOKMARK NOT DEFINED.
1.1.1 FORKLIFT AGVs:.....	ERROR! BOOKMARK NOT DEFINED.
1.1.2 UNIT LOAD AGVs.....	ERROR! BOOKMARK NOT DEFINED.
1.1.3 HYBRID VEHICLES AGVs:.....	ERROR! BOOKMARK NOT DEFINED.
1.1.4 CLAMP AGVs:.....	ERROR! BOOKMARK NOT DEFINED.
1.1.5 VNA AGVs:.....	ERROR! BOOKMARK NOT DEFINED.
1.1.6 TUGGER AGVs:.....	ERROR! BOOKMARK NOT DEFINED.
1.3 AGVs COMPONENTS	ERROR! BOOKMARK NOT DEFINED.
1.3.1 CONTROLLER:	ERROR! BOOKMARK NOT DEFINED.
1.3.2 SENSORS.....	ERROR! BOOKMARK NOT DEFINED.
1.3.3 RF MODEM.....	ERROR! BOOKMARK NOT DEFINED.
1.3.4 NAVIGATION SYSTEM	ERROR! BOOKMARK NOT DEFINED.

CHAPTER 2 – LITERATURE SURVEY .ERROR! BOOKMARK NOT DEFINED.

2.1 ISSUES OF WHEEL SIZE.....	ERROR! BOOKMARK NOT DEFINED.
2.2 NUMBER OF WHEELS IN DESIGNING A VEHICLE.....	ERROR! BOOKMARK NOT DEFINED.
2.2.1 THREE WHEEL LAYOUT:	ERROR! BOOKMARK NOT DEFINED.
2.2.2 FOUR WHEELED VEHICLES:	ERROR! BOOKMARK NOT DEFINED.
2.2.3 FIVE WHEEL LAYOUT:	ERROR! BOOKMARK NOT DEFINED.
2.3 OMNI DIRECTIONAL VEHICLE AND ITS NEED:.....	ERROR! BOOKMARK NOT DEFINED.
2.3.1 CASTER TYPE TWO WHEELS ODV:.....	ERROR! BOOKMARK NOT DEFINED.
2.3.2 FOUR WHEEL ODV:.....	ERROR! BOOKMARK NOT DEFINED.

CHAPTER 3 – REPORT ON PRESENT INVESTIGATIONERROR!

BOOKMARK NOT DEFINED.

3.1 SELECTION OF WHEEL CONFIGURATIONERROR! BOOKMARK NOT DEFINED.

3.2 ASSUMPTIONERROR! BOOKMARK NOT DEFINED.

CHAPTER 4 – DESIGN AND CALCULATIONSEERROR! BOOKMARK NOT DEFINED.

4.1 CALCULATION OF DRIVE:ERROR! BOOKMARK NOT DEFINED.

4.2. CALCULATION OF STEERINGERROR! BOOKMARK NOT DEFINED.

4.3 ARRANGEMENT OF ASSEMBLY.....ERROR! BOOKMARK NOT DEFINED.

4.3.1 DRIVE AND STEERING SYSTEM- TYPE I.....ERROR! BOOKMARK NOT DEFINED.

4.3.2 DRIVE AND STEERING SYSTEM-TYPE II.....ERROR! BOOKMARK NOT DEFINED.

4.3.3 DRIVE AND STEERING SYSTEM- TYPE III.....ERROR! BOOKMARK NOT DEFINED.

CHAPTER NO 5-RESULT.....ERROR! BOOKMARK NOT DEFINED.

5.1 COMPARISON OF ABOVE THREE ARRANGEMENTS.....ERROR! BOOKMARK NOT DEFINED.

CHAPTER 5 - CONCLUSION.....ERROR! BOOKMARK NOT DEFINED.

REFERENCESERROR! BOOKMARK NOT DEFINED.

Table of figures:

Fig 1.1 Forklifts AGV.....	3
Fig 1. 2 Unit load AGV.....	4
Fig1.3 custom made AGV.....	5
Fig 1.4 control configuration.....	6
Fig 2.1 Three wheel layout.....	11
Fig 2.2 Four wheel layout.....	11
Fig 2.3 Five wheel layout.....	12
Fig 2.4 Six wheel layout.....	13
Fig 2.4 Six wheel layout.....	14
Fig 2.6 differential steering.....	15
Fig 2.7 four wheels ODV.....	17
Fig 3.1 wheel configuration.....	19
Fig5.1 type-1 2-d drawing.....	33
Fig5.2 type-2 solid work3-d model.....	34, 35
Fig 5.4 type-2 2-d drawing	37
Fig 5.5 type-2 solid works 3-d model.....	38, 39
Fig5.7 harmonic drive.....	40
Fig 5.8 Type-32-d drawing.....	43
Fig5.9 type-3 solid works 3-d model.....	44, 45

List of tables:

Required parameter table.....	25
Selection of motor table.....	28
Selection of gearhead table.....	28
Selection of motor for steering table.....	30
Selection of gearhead for steering table.....	30
Output put of drive system table.....	32
Output put of steering system table.....	32
Bearing table.....	32
Harmonic drive for drive system.....	42
Harmonic drive for steering system.....	42
Comparison table.....	47