

# INTRODUCTION TO VERTICAL MULTISTAGE CAR PARKING SYSTEM

Trupti Y. Nirwan<sup>1</sup>, Akash S. Waghmare<sup>2</sup>, Gaurav R. Rahate<sup>3</sup>, Kartik Bhujade<sup>4</sup>, Asaraf Ali Saiyyad<sup>5</sup>, Adarsh Shahu<sup>6</sup>, Prof. A.D. Anjekar<sup>7</sup>

<sup>1,2,3,4,5,6</sup> Student, Dept. Of Mechanical Engineering, Priyandarshini Bhagwati College Of Engineering, Nagpur, Maharashtra, India

<sup>7</sup>Professor, Dept. Of Mechanical Engineering, Priyandarshini Bhagwati College Of Engineering, Nagpur, Maharashtra, India

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**Abstract** - In metropolitan cities, vehicle parking has become a major concern in all busy areas and a good traffic system needs a good parking system. Different types of vehicle parking are applied worldwide namely Multi-level Automated Car Parking, Automated Car Parking System, Volkswagen Car Parking, vertical car parking etc. Parallel parking is challenge for all drivers say amateurs or the experts. An multistage car parking system is a solution to this ordeal. This paper explains in detail a simple and precise multistage car-parking introduction, advantages, characteristics, etc. This paper give the information to develop a reduced working model of a car parking system for parking 6 to 24 cars within a parking area of 32.17 m<sup>2</sup>. The chain and sprocket mechanism is used for driving the parking platform and a one fourth hp brake motor shall be implemented for powering the system and indexing the platform. The platform is fabricated to suit.

## 1.INTRODUCTION

Car parking has been, and still is, a growing problem with increasing vehicle sizes in the luxury segment. This is especially true when bearing in mind the confined parking spaces in parking lots and cities. A multi-level car parking is essentially a building with number of floors or layers for the cars to be parked. The different levels are accessed through interior or exterior ramps. An automated car parking has mechanized lifts which transport the car to the different levels at a certain position. These car parks need less building volume and less ground space and thus save on the cost of the building. Car parking is an issue of significance both at the local and at the strategic level of planning. In order for parking policy decisions to be well founded, the analysis of parking behavior and the effects of parking policies should be fully integrated With the other elements of the transport planning and modeling process.

## 1.1 HISTORY OF MULTISTAGE CAR PARKING SYSTEM

The earliest known multistage car parking system was built in 1918. It was built for the Hotel La Salle in Chicago. IL at 215 West Washington Street in the West Loop area of downtown. It was designed by Holabird and Roche. The Hotel La Salle was demolished in 1976, but the parking structure remained because it had been designated as preliminary landmark status and the structure was located several blocks from the hotel it was built to service. The Hotel LaSalle multi-level was demolished in 2005 after failing to receive landmark status from the city of Chicago. Jupiter Realty Corp. of Chicago is constructing a 49-level apartment tower in its place with construction underway as of March 2008. During the 1920's and 1930's a series of other patents were granted but it was not until the late 1940's that the Bowser, Pigeon Hole and Roto Park systems became operational and installed in numerous locations. Some of these early systems were vertical elevator lift modules that placed cars on upper levels of a structure to be moved by attendant and others mechanical devices that could move vehicles into "slots" in a framework built around a central corridor. Capacities ranged typically from less than 100 spaces to more than 600. Automated car parks rely on similar technology that is used for mechanical handling and document retrieval. The driver leaves the car in an entrance module. It is then transported to a parking slot by a robot trolley. For the driver, the process of parking is reduced to leaving the car inside an entrance module. At peak periods a wait may be involved before entering or leaving. The wait is due to the fact that loading passengers and luggage occurs at the entrance and exit location rather than at the parked stall. This loading blocks the entrance or exit from being available to others. Whether the retrieval of vehicles is faster in an automatic car park or a self park car park depends on the layout and number.

## 2.BENEFITS OF MULTISTAGE CAR PARKING SYSTEM

- Safety and security
- Save time, money and fuel
- Environment-friendly
- Systematic

### 2.2 Unique Characteristics

- The space for parking 3 cars can hold more than 9 cars.
- It adopts rotating for mechanism so as to minimize the vibration and noise.
- Flexible operation.
- No caretaker is needed, key pressing operation.
- High safety, complete inspecting device
- Stable and reliable

It is simple to operate with the driver parking and leaving the vehicle in the system at the ground level. Once the driver leaves the incorporated safety zone the vehicle is automatically parked by the system rotating to lift the parked car away from the bottom central position. This leaves an empty parking space available at the ground level for the next car to be parked on. The parked car is easily retrieved by pushing the button for the relevant position number the car is parked on.

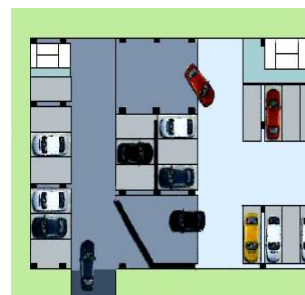
This causes the required car to rotate down to ground level ready for the driver to enter the safety zone and reverse the car out of the system. Except vertical car parking system all other systems use a large ground area, vertical car parking system is developed to utilize maximum vertical area in the available minimum ground area. It is quite successful when installed in busy areas which are well established and are suffering with shortage of area for parking. Although the construction of this system seems to be easy, it will be par from understanding without the knowledge of materials, chains, sprockets, bearings, and machining operations, kinematic and dynamic mechanisms

Imagine the time that automatic multistage parking systems would save you. Every time you enter your office building you have to find a parking space and spend time walking in and out of the lot as well. Imagine how much time it is costing you. Even if you just spend 5 minutes a day to park that translates to you spending more than a whole day just parking every year.

If you calculate the time you spend walking in and out of the parking lot, searching for space and such it will be easily more than the above amount. A fully automated system mimics a futuristic assembly line structure where the cars are moved to an empty platform. The platform under the car moves to a designated spot and all the other platforms are arranged so that no cars are stuck.

### 2.2 Comparison between traditional car parking and multistage car parking system:-

Traditional car parking system-



Top view

Multistage car parking system-



Top view

- Engineered to ensure Driver safety by use of an electronic Safety zone.
- Low maintenance levels required by the system.

### CONCLUSIONS

Vertical Car Parking model has been designed; all the parts in it were manufactured and assembled and tested successfully.

Analysis of the model has been done and developed with the scaling of 1:9 for life size model Such as SUV's like Fortuner. As the life cycle model involves proper design and advanced methods are to be used to meet the requirements of the customer. Quick Automated Parking and retrieval of vehicles.

Up to 12 cars can be easily and safely parked. Surface space required equivalent to just 2 surface car parking spaces. Most suitable for Staff or dedicated user parking. Engineered to ensure Driver safety by use of an electronic Safety zone. Low maintenance levels required by the system.

### REFERENCES

- [1] Pijush Kanti Babu, Kousik Mandal, Jatindra Bimal Mukherjee, (2006) "Coin Operated Automatic Car Parking System", A note on car parking. (pp 1, 2, 6).
- [2] R. Charette, "Smart Parking Systems Make It Easier to Find a Parking Space," <http://spectrum.ieee.org/green-tech/advanced-cars/smart-parkingsystems-make-it-easier-to-find-a-parking-space/0>, 2007.
- [3] Chandni Patel, Monalisa Swami, Priya Saxena, Sejal Shah, "Rotary Automated Car Parking System".
- [4] A. ALBAGUL, K. ALSHAREF, M. SAAD, Y. ABUJEELA, "Design and Fabrication of an Automated Multi-level Car Parking System".
- [5] Sawankumar G. Narone, Swapnil S. Chabukswar, Shriharh A. Valyal, Ravikant B. Hirapure, Prof. V. R. Solapure, "Vertical Car Parking – A Prototype"
- [6] Ankit Gupta, Rohan Divekar, "Autonomous Parallel Parking Methodology for Ackerman Configured Vehicles".



FIG 1:- Assembly of multistage car parking-system.

### Advantages:-

- Quick Automated Parking and retrieval of vehicles.
- Up to 12 cars or 10 SUV's can be easily and safely parked.
- Surface space required equivalent to just 2 surface car parking spaces.
- Most suitable for Staff or dedicated user parking.