The design of multi level car parks tourism essay

Car sales, close to 8 lakh units a year, are growing at an average rate of 10 per cent while two-wheeler sales at 5 million are expected to grow 14-15 per cent. In order to accommodate the large volume of vehicles, small cities and towns must develop their infrastructure – roads, flyovers, car parks and other facilities. Otherwise their arteries are most likely to get clogged like they do in big and mini metros.

One solution may be a multi-level car parking system to maximise car parking capacity by utilising vertical space, rather than expand horizontally. Although at a nascent stage in India, it is one of the options to decongest roads and solve parking problems.

However, with land in metros and ' A' grade cities becoming scarce and dearer, and plots getting smaller, conventional parking is proving infeasible. Sometimes soil conditions rule out excavation for multiple basements, or multiple RCC parking slabs take total building height beyond permissible limits. Sometimes it is found that the ramp or car lifts eat up much parking area that no increase in parking capacity is possible. In such case, mechanised car parking systems make creation of extra parking capacity feasible. So far three types of mechanised car parking systems — puzzle, tower and mini — have been operating in India. In each of these, the car is always parked or retrieved at one level only, and the stationary vehicle is carried to different levels in steel pallets.

The number of vehicles in metros is approaching one million mark. Mumbai has over 13 lakh vehicles, and up to 200 are added everyday. Suburbia Mall, Kalptaru Builders, and Evershine Builders in Mumbai are equipped with multi-

level car parking system. Even towns like Chittorgarh and Jaipur are interested in multi-level car parking (also called elevated car parking system).

The puzzle system is configurable and module capacity can vary. For instance, car parking space meant for two cars can accommodate three cars. The optimum capacity of the tower type system is 50 meant for three. Fully automatic systems generally cater to higher capacities per unit. Since conventional multi-level car parks have a clear height of 9 ft. to 10 ft. above each level, they can accommodate Small Utility Vehicles also.

The mechanised system does not cater to these. It is possible to customise systems to accommodate SUVs, but it has not been done so far. " Any decent capacity parking plan invariably has ground parking slots (where no mechanized system can fit), and these usually suffice for the proportion of SUVs," says Rajeev Goel, CEO, Kinetic Escalator & Elevator Ltd.

Depending on the type of system and order size, the mechanised parking systems installed by Kinetic cost from Rs 2 to 3. 5 lakh per car. A semi-mechanised (valet parking) option is also available per car cost under one lakh. Depending on the type, its configuration and position of the pallet, it takes half to two-and-half minutes from the press of a button to an approaching car to the drive way level to park a car on it or drive away the car parked on it.

Parking charges depend on what the user is wiling to pay, and whether he has an option to park nearby without paying. A parking slot may be permanently allotted/sold/leased to the built-up area buyer/lessee. Where an

owner can charge parking fees by the hour, the fee depends on demand and supply of parking space, not on the parking system. It can vary from Rs 2 a day to Rs 25 an hour.

Many state governments and civic bodies, and some Central government departments are aware of these systems and are expected to give them push. Some civic bodies have liberalised bylaws to enable builders to maximise parking capacity in their projects. Some civic bodies have also floated BoT or like tenders inviting private investment in maximising public parking capacity, according to Goel. " The government shouldn't allow parking on roads, " states Shree Gopal Kabra, President, Ram Ratna Group.

Goel is quite confident that the demand for car parks is an integral part of a residential or commercial complex, rather than an independent commercial venture. However, it may take years before parking fees in India reach a level at which the investment in these systems and their maintenance cost can be recovered from parking fees alone. Kabra says that a multi-level car parking system will be a success in commercial layouts. One has to club towers with ad revenues or with some other alternatives like commercial activities so that the revenue keeps flowing to the owners who implement car parking systems.

Design

Image of the inside of a multi-storey car park

Movement of vehicles between floors can be effected by:

interior ramps – the most common type

exterior ramps – which may take the form of a circular ramp (colloquially known as a ' whirley-gig' in America)

vehicle lifts – the least common

In locations where the car park is built on sloping land, the car park may be split-level.

Many car parks are independent buildings that are dedicated exclusively to that use. The design loads for car parks are often less than the office building they serve (50 psf versus 80 psf), leading to long floor spans of 55-60 feet that permit cars to park in rows without supporting columns in between. The most common structural systems in the United States for these structures are either prestressed concrete concrete double tee floor systems or post-tensioned cast-in-place concrete floor systems. In recent times, car parks built to serve residential and some business properties are built as part of a larger building, and often are built underground as part of the basement.

Motorcycle parking inside a multi-storey car park

Car parks which serve shopping centres can sometimes be built adjacent to the shopping centre so as to effect easier access at each floor between shops and parking. One example is the Mall of America in Bloomington, Minnesota, USA, which has two large car parks attached to the building at the eastern and western ends of the mall. Another common position for car parks within shopping centres in the UK is on the roof, around the various utility systems, enabling customers to take lifts straight down into the

centre. Examples of such are The Oracle in Reading and Festival Place in Basingstoke.

Automated parking

Automatic multi-storey car parks provide lower building cost per parking slot, as they typically require less building volume and less ground area than a conventional facility with the same capacity. However, the cost of the mechanical equipment within the building that is needed to transport cars internally needs to be added to the lower building cost to determine the total costs. Other costs are usually lower too, for example there is no need for an energy intensive ventilating system, since cars are not driven inside and human cashiers or security personnel may not be needed.

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 of exits.

Advantages:

The advantages of this can be seen immediately: there is no room to build conventional multi-storey car parks above ground in the areas they are required, and under-street parking is actually more cost effective than other schemes on a per parking space basis. In addition, an automatic system brings significant savings in engineering because elevators, ramps, stairways, lighting and ventilation do not need to be provided to the same extent. The construction, however, also means the transfer of sewer, storm drains and water services from beneath the centre of the road to conduits at the side of the roads.

PARKING PROCESS

Cars (maximum dimension 5. 25m long, 2. 2m wide and 1. 7m high) must be driven to one of four receiving stations (marked A to D), the entry to which is actuated by a control device which responds to a transponder chip held in the car by the user.

On gaining entry the driver proceeds to correctly position / park the car on a transfer ramp and then locks and leaves the vehicle. A combination of laser scanners and light barriers will then examine the car for its positioning and dimensions. The elevator ramp is then actuated and the car is raised to its parking level and stored (cars are parked side by side).

" In July 2007 the Wöhr Multiparker 740 equipped garage was given the ADAC Award (German Automobile Association) for the best use of space, security and reliability."

On returning, the driver comes to the same transfer station (they may pay by credit card at an automated paying station) and the car will be retrieved from its storage level according to the transponder chip still held by the driver. The car is retrieved on its transfer pallet and the driver simply drives away through automated exit gates. The pallet has a lighting system which illuminates the area for two minutes while the driver gets into the car.

Customer help is available via an intercom system 24 hours per day in case of breakdowns or unforeseen problems. If a car is not retrieved for its owner within two hours then the owner receives compensation from the parking operator.

PROJECT 1: TECHNOLOGY TYPE SIMPARK (Completed in November, 2001) CALCUTTA, INDIA

We make Calcuttans proud by introducing the " World's First Fully Automatic Mechanized Public Multi-Level Car Parking System on a Curve", at the intersection of Park Street-Rawdon Street crossing, in a Joint Venture with the Kolkata Municipal Corporation. The ground plus two-storied computer based system, accommodates upto three times more than conventional parking. The system at Rawdon Street has been constructed to provide car-parking facility for around 210 cars on a ground area of 1260 Sq. Mtrs. Each row can individually hold on average 73 numbers of cars. The system is operated from both the ends of the structure. Each lift lobby having its own individually control panel and ticketing system. However, one can park and retrieve his/ her car from either end and vice versa.

A steel pallet is designated for every car slot in the system. Whenever a car needs to be parked, the ticketing button is pressed and the entrance gate opens only after a pallet has been delivered. The driver parks his car on the pallet, engages a gear, locks his car (optional as nobody can go inside the system and your car is safe as in a vault), and walks out of the system. The tickets to the system is a simple the magnetic strip cards, which the ticket attendant swipes. From herein onwards, the computer takes over. One must remember not to lose the magnetic card as it contains information on the parked vehicle.

Technologies : Simpark

The beauty of this Parking system is inherent in its intrinsic simplicity.

It is a modular Lego like system and therefore can be adapted to fit any size or shape of plot. Each grid has an independent lift and each floor or array of cars has its independent carrier. For every car to be parked in the system, there is a steel pallet designated when a car is to be parked, on a button being punched the entrance gate opens. The driver parks his car on the pallet, engages a gear, locks his car (optional), and walks out of the system. From herein onwards, the computer takes over.

Uniquely designed lift, enables carriers to pass through lift shaft, when lift is not in the specific floor. More than one lift can be placed in each row at either end, or in the middle as required.

THE PARKING PROCEDURE

The PLC system computer decides, which floor, which and slot the pallet with the car is to be placed is to be parked on. Accordingly, the pallet with the car placed on it is taken up with the help of the vertical elevator system to the desired floor.

The next step is that on reaching the particular floor the carrier system picking up picks up the pallet along with the car, and moving it horizontally along the structure over the other vehicles to the place assigned by the computerit slowly lowers it into the slot assigned by the system. It should be made quite clear here, that the height of each floor, is a little more than twodouble the cars height, so that the carrier transports the car above the already parked cars.

Retrieval of parked cars is precisely the same operation, but in the reverse order. When the driver comes to collect his car, he gives the ticket/magnetic card, which was given to him on parking. The card is swiped and; automatically the bill for parking is generated for payment. Simultaneously the computer has issued the order for retrieval. Carrier picks up the relevant pallet, transports it over other cars and places it on the elevator. The elevator brings down the pallet. On retrieval retrieval, through a turntable, the pallet takes a turn and keeps the car is in a drive-out position. The Main gates opens automatically, driver walks in and drives out in his carfor the driver to drive out his car. The Gate close automatically and the system is on standby for the next requests.

The entire system can operate, with just one ticket attendant in each lobby. In case of the remote eventuality of any problem, the same shall be reflected

immediately in the master computer in the control room and the fault rectified within minutes.

SERVICES OFFERED

1. Night parking.

2. Multiple Entry and Exit facilities.

3. Provision for long term booking of parking slots.

4. ATM and Vending Machine.

5. Public Call Booth.

6. Front / Backlit show windows for corporate and product advertising

CONSTRUCTION DETAILS

We have used RCC grid of Concrete Column and Beam only for the parking tower. There are no slabs for the parking tower. Top Roof is done with coated G. I. Sheets simply supported by Crush Structures.

The structure has been designed for required dead load & lift load as per I. S. Standard. Necessary construction instructions as per I. S. Construction have been provided.

Elevators have been placed at both the end of the structures. The Control Panel with P. L. Cs will control the movement of the elevator and Electronic devices.

Fire fighting with sprinklers system has been provided. The fire fighting system has been divided into various zones. Wet risers have also been provided. Other details have been met as per fire laws and by-laws.

Round the clock, security cameras have been provided for recording the vehicles entering and exiting the system. These security cameras would also be utilized for recording the movement of people in the entire compound.

" Managing of a Multilevel Parking Lot using IPv6"

Problem with multilevel parking lot now

To find a parking space in a crowded multilevel parking facility now, the driver must be

lurking around while driving. Even if not speeding, this is very dangerous. The

possibility that a accident resulting in injury or death could happen is very high here.

To solve this problem

If a parking space at a multilevel parking lot can be found without the driver lurking

around, the number of accidents can be decreased. So, I thought of attaching each curb

at the parking space with a sensor using IPv6. And the open space can be checked at

the entrance of the parking lot, and reach there without the driver lurking

around.

How to use IPv6

1) Each curb at the parking space is attached with a sensor by IPv6.

First, each curb is attached with a sensor so the position and floor of the

place open

can be known.

2) The open space can be known by the screen placed at the entrance of the

parking lot,

using a sensor.

Another problem

If a car ahead of you parks at the place you were think of parking, this

system will be

useless.

To solve this problem

When deciding where to park at the entrance of the parking lot, a simple

reservation is

made, so the next person knows that the place is taken.

By doing so, the driver does not have to lurk around when a person ahead of you parks

at the spot he/she was thinking of parking.

Image of Screen at Parking Entrance

R e d- – -The sensor shows that there is a car.

B l u e- – -It is open now, but the person ahead of you is trying to park there.

White- – -The space is open.

The screen is a touch panel, and reservation can be done by pressing the

screen, and the status of the 3rd, 4th, and all floors can be checked

By making this facility, accidents at parking lots will decrease

In the limelight

Kolkata's first underground automated car parking system was now acting as a showpiece attracting municipal corporations from around the country.

The Municipal Corporation of Delhi has already signed an agreement with Simpark for such projects at more than one station.

Hi-tech bay: Cars at the underground parking lot built by Simpark Infrastructure at the New Market complex in Kolkata. The facility will be opened to the public on April 20.

Kolkata April 15 Simpark Infrastructure (P) Ltd, a wholly owned subsidary of Simplex Projects Ltd, braving several odds has just completed an

underground modern automated car parking system at one of the most congested areas of the city – the New Market complex, a relic of the Raj to which all Kolkatans are emotionally attached.

A trip to the Market for pre-Christmas shopping is a must for both young and old.

The engineering marvel 30 ft below the ground has been achieved without disturbing the red brick-stoned heritage New Market structure facing the southern façade, including the fabulous clock tower to the left.

Initially planned as a multi-level car park above ground, the BOT project, facing stiff resistance from the market shop establishments, was shifted below with a shopping mall at the minus one level and the actual gantry system car parking at the minus two level. Sheet piling over a period of 18 months was done to safeguard the old buildings facing the market complex.

Top down construction method has been adopted (no cannibalisation of the top surface), and the gantry system can be accessed through five entry points (gates) for cars to be placed on pallets, which will take them down to the designated parking slot. Fully computerised, there will be just one person each at the entry point to operate the system, and car recovery is said to take just 90 seconds.

Showpiece

Cited as Kolkata's first underground automated car parking system, the project, commissioned by the Kolkata Municipal Corporation (KMC), according to Mr B. K. Mundhra, Chairman and Managing Director of Simplex

Projects, was now acting as a showpiece attracting municipal corporations from around the country. He said the Municipal Corporation of Delhi has already signed an agreement with Simpark for such projects at more than one stations.

Talking to Business Line on the various challenges faced during the four-year construction period of the Rs 34-crore BOT project (with a 20-year concession period) by the Simpark engineering team, Mr Mundhra said the company has been able to just about break-even.

" The gain for us is the immense satisfaction of having completed such a difficult project in a small stretch (just 40, 000 sq ft), capable of accommodating some 280 cars."

He said the KMC would get 5 per cent of the parking fees, which is projected to be around Rs 2. 5 lakh annually. The main earning for KMC will be through secondary basic rent from shop owners in the plaza.

This is expected to yield annually around Rs 10 lakh for KMC while providing hassle-free parking for Kolkatans. Some 150 shop owners are said to have booked space at the plaza.

Asked on Simpark's future plans, Mr Mundhra said the company was planning to enter the semi-automatic private " retail parking" segment with the " Intelligent Cubicle Sliding" system, for which it has entered into a strategic tie-up with a Korean company.

He said orders for prototypes of the compact system, which can be installed easily at building sites to fulfil private parking needs, have already been placed.

A base level model, for holding some 8-10 cars, may cost anything between Rs 1. 75 lakh and Rs 2. 5 lakh.