

# ORBIPARK AUTOMATIC GARAGES

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**Abstract** — This contribution discusses the following questions:

- Parking in the past and Today
- Impact on Ecology
- Impact on Traffic and Congestion from Parking Today
- Smart Growth in Our Future? Urban Planning Trends
- Ideal location for different automatic parking garages types
- Automatic garages
- Orbipark Automatic Garage
- Why round Automatic Garage?
- OrbiPark Automatic Prefabricated Parking Technology description

**Index Terms**— Automatic garages, garages, parking, stationary traffic, urban planning.

## I. INTRODUCTION

Automated Parking is Reducing Volumes of Stationary Traffic.

OrbiPark (*urbi et orbi*) is a new concept for automatic valet parking that is built on-site for the maximum convenience and efficiency for both facility owner and customer. It is a system made of low cost prefabricated parts that can be custom adapted to different locations and functional needs.

time = t = 365 x 24 hours = 8760 hours  
 distance = d = 25.000 km  
 average speed= s = 50 km/h

$$s = \frac{d}{t} \quad t = \frac{d}{s} \quad t = \frac{25.000 \text{ km}}{50 \text{ km/h}} \quad t = 500 \text{ h}$$

8.760 h.....100 %  
 500 h..... X %  
X = 5,7 %

**Car is in use 5,7 % of the time  
 the rest 94,3 % is parked**

*% time when car is in motion compared to stationary time (based on average km driven per year in Slovenia)*

	40	50	60	70	80	km/h
10.000	2,9%	2,3%	1,9%	1,6%	1,4%	
20.000	5,7%	4,6%	3,8%	3,3%	2,9%	
30.000	8,6%	6,8%	5,7%	4,9%	4,3%	
40.000	11,4%	9,1%	7,6%	6,5%	5,7%	
50.000	14,3%	11,4%	9,5%	8,2%	7,1%	
60.000	17,1%	13,7%	11,4%	9,8%	8,6%	

km/year

*% time when car is in motion towards km/year and average speed km/h*

## II. PARKING IN THE PAST AND TODAY

Garages today are followers of the idea of the shed or a stable in the past, to park a transportation medium.

The demand for parking has been in last decade increasing despite the emergence of telecommuting and virtual offices.

Developers are creating more 24-hour environments with entertainment and restaurant venues. So the need for round-the-clock parking facilities has actually increased substantially over the last few years.

## III. IMPACT ON ECOLOGY

Environmental problems caused by transportation:

- Energy
- Asphalt
- Air pollutants and greenhouse gases
- Noise pollution
- Spills of hazardous materials
- Fugitive dust emissions
- Water pollutants
- Waste at car production
- Old cars
- Occupying land
- Habitat disruption (road kill)

## IV. IMPACT ON TRAFFIC AND CONGESTION FROM PARKING TODAY

Air pollution could be reduced because automatic parking eliminates the need for cars to cruise through the garage for parking spots. One study suggests that during peak traffic hours about 50% of all cars driving in downtown urban areas are simply touring for a place to park.

Automated parking garages reduce the overall amount of developed land and paving – paved land produces polluted runoff (dirty water you see running into sewers after a rainstorm, which is among the largest sources of water pollution.)

Using less land in construction is significant when one considers the dramatic increase in the rate of land development in metropolitan areas in recent years. [1]

In several years from now, this fact will have a major impact on our expansion, as it shows, that actually ONLY with automated parking technology:

- *parking spaces could be generated sufficient in congested areas, and*
- *only with these system, a comfortable and convenient parking can be provided, eliminating driving through endless ramps and wasting space*

#### V. SMART GROWTH IN OUR FUTURE? URBAN PLANNING TRENDS

The impact of today's existing parking facilities in a given downtown as to land use is much more than expected.

The 'New Urbanism' association, the 'Smart Growth' movement introduced by ULI, Urban Land Institute, Washington D.C., and the Natural Resource Defense Council in D.C. urge urban planners to consider and utilize land saving concepts in infrastructure planning. This is an important factor for future development, as we all want to take care about our common environment and want to protect it for future generations.

It seems that everywhere – from North America to Europe – people are concerned about the environmental impact of growth and development. People are motivated by environmental concerns, especially loss of green space and access to nature.

The revitalization of urban places depends on safety and security. The design of streets and buildings should reinforce safe environment, but not at the expense of accessibility and openness.

Not many cities are able to control traffic with their infrastructure, and good public transportation (trains, subway lines...). However, all traffic is not possible to direct towards public transportation.

Other aspects to the subject were voiced in a recent Canadian Parking Congress '97 held in Toronto on which delegates agreed to the axiom that "Personal mobility is a right". Personal mobility is very often expressed as freedom.

The problem is urgent in the fast growing cities, which don't have an adequate infrastructure.

Since the change of the economic and political systems in Eastern Europe and Asia the number of cars rapidly increased. And there are no suitable parking places.

#### VI. IDEAL LOCATION FOR DIFFERENT AUTOMATIC PARKING GARAGES TYPES

Dense populated areas lacking space for a regular parking garage are the ideal locations for automatic parking garages. From the environmental viewpoint any location would be better off with the automatic garage compared to the regular one. Since they could vary in size and type the right one should be chosen for the specific location.

#### VII. AUTOMATIC GARAGES

Automatic garages use automatic systems to park cars. They do not require driving into the garage to the parking spot.

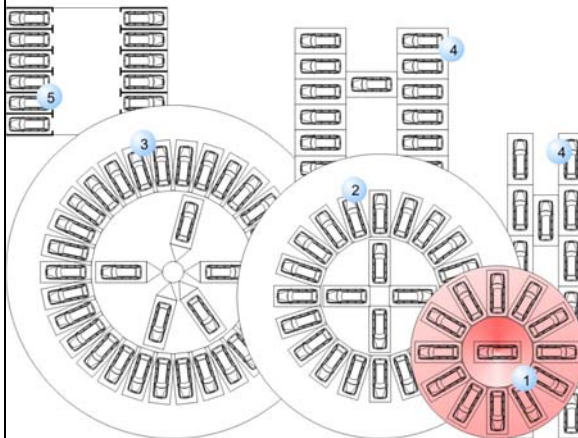
The automated parking garages are not a new idea. First automated parking garage was built around 1920, however it looks like that just high price of land (Japan) could make the garages interesting for investors.

Known attempts to build automatic parking garages by well-known companies are Krupp\*, Noell\*, Thyssen\*, Siemens, Maurer & Söhne, Round Palis\*, Demag, Doppelmayr's Parktec, and others. Their later projects have incurred costs in the range of \$21,000 per parking space. In the last few years, a number of the largest companies have closed\* their automatic parking divisions. These failures are attributable to impracticalities and weaknesses in design and operations that have not given automatic parking garages a reputation for convenience and reliability among motorists and facility owners.

In our research for the automatic garages we noticed important factors for building the automatic garage:

- Land price
- Local parking policy and building regulations
- Habits and psychology of drivers
- Garage systems offered

No.	Garage type	No. / floor	No. of floors	No. in garage	m <sup>2</sup> garage surface	m <sup>2</sup> / vehicle
1	OrbiPark	12	10	118	328	2,78
2	Maurer	20	10	180	1.017	5,65
3	Round Palis	30	10	270	1.320	4,89
4	Shelf warehouse	20	10	190	580	3,05
5	Normal Parking	20	1	20	460	23,00



Comparison of different parking garages and parking lots.

### VIII. ORBIPARK AUTOMATIC GARAGE

OrbiPark offers a reliable garage that is safe and fast - max. 48 seconds for complete vehicle retrieval from the 5th floor, for example. Due to its unique construction concept and round shape the garage can be rapidly built with little disruption to the area surrounding the site. The garage can be custom fit to any location and in the same time as any "cookie-cutter" mass-produced multi-storey garage.

The short vehicle recovery time in **OrbiPark** is attributable to **OrbiTwins**, a patented vehicle movement system which removes the vehicle from the entry port and allows another car to be parked in the entry port immediately after the preceding vehicle moves onto the central elevator. So **OrbiTwins** system is based on double time use and we claim the world's best - efficient automatic parking concept for small side downtown locations.

### IX. WHY ROUND AUTOMATIC GARAGE?

Round form is not known as rational, space wise, but when we talk about garages is not like that.

Round form gives us the shortest possible distance from the entering area.

It gives us better construction strength, when is built underground and uses smaller excavation area.

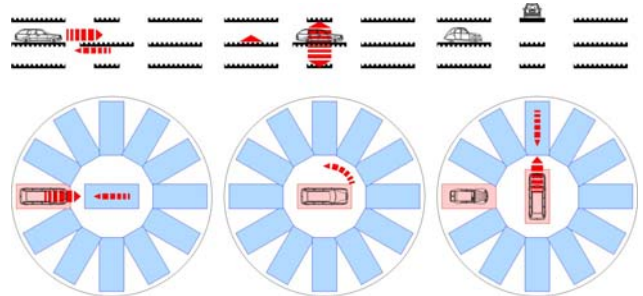
We should not forget that these advantages do not work for any height, or size of cylinder.

When we increase diameter of garage we increase:

- Linear edge of a ring (number of cars)
- Manipulative area with a square

- Volume of a garage already with a square

It is economical to built round garages with a limited diameter and constructs them close together.



OrbiTwins system operation

### X. ORBIPARK AUTOMATIC PREFABRICATED PARKING TECHNOLOGY DESCRIPTION

#### A. General ADVANTAGES

- High security for driver and vehicle
- Comfort and ease of use
- Ecological: no exhaust gases generated
- Lower price per stall as compared to typical concrete structures
- More efficient Land use
- Less material excavation for facility size per car/unit

#### B. SIGNIFICANCE of OrbiPark

- All manipulations of the vehicle are performed automatically
- The building is quickly assembled with the use of prefabricated parts
- Could be used also as a temporary facility
- Rational in construction
- Easy adaptable to different locations
- Very easy to manage and service
- Is proposed for shorter parking time in the downtown

#### C. ADVANTAGES of OrbiPark parking

- Deposit and retrieval of the vehicle takes place in a safe location
- Savings on construction height - in the space of 4 traditional floors OrbiPark has 5
- The time to access any stall within 5 floors (whole cycle) is just 48 seconds maximum
- Parking in OrbiPark is clean and protected
- OrbiPark may be operated in a fully automatic mode and does not require an operator

D. *SITE CONFIGURATION of OrbiPark*

- *Above ground*
- *Partly Underground*
- *Completely Underground*
- *Integrated within another building (hotels, offices, production facilities)*

E. *DIMENSIONS of the circular Version*

- *The garage facility is of medium size from 24 to 144 Parking Places*
- *The Parking Places are distributed around in a circle - 12 on each floor*
- *The number of floors are 6-12 typically*
- *The shape is a cylinder with 20 m diameter and about 2 m floor to floor height*

F. *ELEVATOR POWER*

- *Electric motor with electronic controls*
- *Safety backup diesel generator*

G. *ELEVATOR TYPES*

- *Hydraulic up to 5 floors*
- *Elevator with counterbalance*
- *Elevator with circle cable*

H. *APPLICATIONS*

- *OrbiPark is possible to connect with different functions and activities:*
- *Banknote (ATM) Machines*
- *Telephone Box*
- *Shops (Tyre exchange Shop)*
- *Gas Station (Petrol)*
- *Automobile sales showroom and storage facility*
- *Waterworks Tower*
- *Car wash*
- *The facade may be used for poster and screen display*
- *The top could be used as Bellevue terrace with cafe*
- *The top platform could be used for a helicopter landing pad beside hospitals*
- *The whole facility may be covered with greenery a nice green oasis park in the city*

BIOGRAPHIE

**Andrej Cufer** founder of OrbiPark d.o.o., holds a degree in architecture from University of Ljubljana, Slovenia. Title of his thesis work was »Automatic parking«.

REFERENCES

- [1] The Amicus Journal, spring 2000, pg. 19