



## THEME PARK ENGINEERING: MORE THAN FUN AND GAMES

By: R.G. Candiah

Theme parks have been mushrooming in Malaysia recently due to the high demand for leisure recreation. One of the most prominent amongst the premier theme parks is Cosmo's World Theme Park, located in Berjaya Times Square, Kuala Lumpur.

According to Roland Zieher, the Chief Engineer of Cosmo's World Theme Park Sdn. Bhd., a tremendous amount of engineering input is required when designing a theme park, especially theme parks that are indoors and that includes rides.

The Cosmo's World Theme Park is the largest indoor theme park in Malaysia and it has the second largest indoor roller coaster in the world, measuring 800 metres in length. The entire theme park covers an area of 380,000 sq. ft.

"If it is standard rides, you can buy them off shelves after browsing a

given brochure by the manufacturer. However, where non-standard rides are concerned, it takes over 3 months alone on the engineering side for calculating the dynamics, static forces and foundation matters," he said.

Zieher said the theme park was unique as it was within a building and that there was a lot of dynamic forces involved and the engineers' input was vital to configuring the acceleration speeds with different loads and the optimum static calculations of the columns of the track.

"All calculations have to be done prior to even setting up the initial architecture plan," he said adding that it was a feat to construct the theme park as it was on different levels of the Berjaya Times Square building.

"It was a challenge to construct the columns for the roller coaster on different levels."

Zieher said that the building requirements, restrictions and clearance from the walls were an important issue when designing an indoor theme park. The roller coaster and the theme park are constructed on several levels from the fifth to the eighth level of the shopping mall.

"In building an indoor theme park, we have to work closely with the architect as the structure of the building needs to be taken into consideration," he said adding that an outdoor theme park, was much easier to construct. This is because once the soil/foundation investigation and approval has been obtained, work could commence.

"Elements such as vibrations, emissions and noise pollution are all important issues. Here, we have overcome such issues by several measures. The track of the roller coaster is based on rubber bearings to eliminate the vibrations. The columns holding the tracks are filled with sand for more mass," he said stressing that if such measures were not taken, the whole building would vibrate and this could be detrimental to the related building structure.

### PLANNING A THEME PARK

According to Zieher, the first requirement when planning a theme park would be the question of whether the theme park would cater for the family, the thrill seeker or a mixture of both. Secondly, what kind of rides needed to be put in and finally, whether these rides were standard rides which could be bought off the shelves or customised rides which would be more expensive to design and build.

Cosmo's World theme park was more focused on attracting families and is strategically positioned as a family theme park.

### ENSURING SAFETY

Zieher said the rides in Cosmo's World have gone through stringent safety standards and have been approved by the German inspecting body TÜV, which specialises in maintaining standards and safety.

The local Department of Health and Safety (DOSH) has also been involved and has inspected the theme park during the installation and commissioning stage.

"We are the first theme park in Asia to obtain the TUV approval. All major rides have 3 stages of approval. During the design stage, TUV approves all drawings, calculations and will initiate modifications should it not meet the stringent safety standards," he said adding that the TUV inspecting body goes to the manufacturer to check if all material certificates are present and works are done according to the drawing plans.

"The third stage involves the inspection of the installation itself. They physically measure variables such as the acceleration, speed, voltage, amperage and magnetic field strength that may affect the function and safety of the rides," he said.

As for in-house safety, Zieher said the rides are subject to stringent safety checks daily and there are 2 in-house paramedics should any visitor feel sick. The theme park has a staff of 120 people, including 50 operators and 23 maintenance personnel, the majority of which, comprise of engineers.

The safety element for an in-door theme park is markedly different from that of the surrounding shops and offices. "Safety is of prime importance



and maintenance is carried out 24 hours in 3 shifts. We do all our weekly and monthly checks in the night, and in the morning, prior to the theme park starting, it goes through another daily stringent test," he said.

Zieher said the technology of the rides was based in Europe. It currently has 14 rides, 3 from Switzerland, 10 from Italy and 1 from the United Kingdom. During manufacturing, there was a transfer of technology where local engineers went to the manufacturers in Europe to obtain training to maintain the rides from the foreign ride manufacturers and consultant engineers.

## THE RISE OF EDUTAINMENT

According to Zieher, Malaysians appreciate indoor parks due to the Malaysian weather. Cosmo's theme park also propagates entertainment with "edutainment" where an educational experience is incorporated well with entertainment.

"We also get requests from engineering faculties wanting to visit the theme park as here, they get a brief introduction into the physics of amusement rides. You get the whole field of engineering from mechanics, electronics, electrical, physics, dynamic, etc. here. Students can experience what is 4.5G acceleration: they understand better once they take the ride," he said.

"They will learn elements of braking force, speed, and friction and this is part of edutainment," he added.

Zieher said theme parks in Malaysia are trying to emulate their overseas counterparts, as it is common for theme parks in Europe to have edutainment centres that have classes, experiments and other interesting educational elements.

## CUTTING-EDGE TECHNOLOGY IN THEME PARKS

On another note, a pioneer in theme parks, Sunway Lagoon, who has been



a player in the market for some time now and a prominent player amongst the wet theme parks has introduced a new device that the park is hoping will be a replacement for chlorine.

The Aquastel water treatment system is a treatment activity that produces an activated solution called anolyte. Anolyte is a colourless transparent liquid with a slight chlorine smell. It contains various oxidants, predominantly hypochlorous acid and sodium hypochlorite which give anolyte high bactericidal and sporicidal activity. Anolyte's parameters are as follows:

- pH from 2.0 to 8.5
- Concentration (general) of active chlorine 300–500mg/l
- Very high oxidant activity with low (hundredths parts of percentage)

concentrations of working substances that are not chemically harmful and does not form any toxic compounds.

"The treatment produces another activated solution called catholyte as a useful by-product for other applications. The two solutions, anolyte and catholyte which are non-toxic, non-hazardous cold disinfection and sterilisation agents, with stable parameters, are unique in their own way," said R. Selventhran, Manager of Operations and Technical Services Division, Sunway Lagoon Sdn Bhd.

Anolyte which has a pH control range of 2.1–8.5 and ORP of +1200<sub>mV</sub> has a great biocidal potential. Catholyte is a perfect washing liquid and an important means of controlling pH.

"Both of these solutions are used for treatment of water for drinking as well as for other applications including treatment of water for water pools," he said.

"These environmentally friendly solutions largely overcome health and safety measures as well as environmental pollution problems associated with systems using chemicals like chlorine. These solutions do not allow the growth of algae in swimming pools. Cost wise, it is very much cheaper than chlorine and there is no burning sensation in the eyes associated with chlorine treated water," he said.

He said the device will soon be introduced to all theme parks and currently is being tested in a town in Malaysia where water is supplied to residential homes. ■