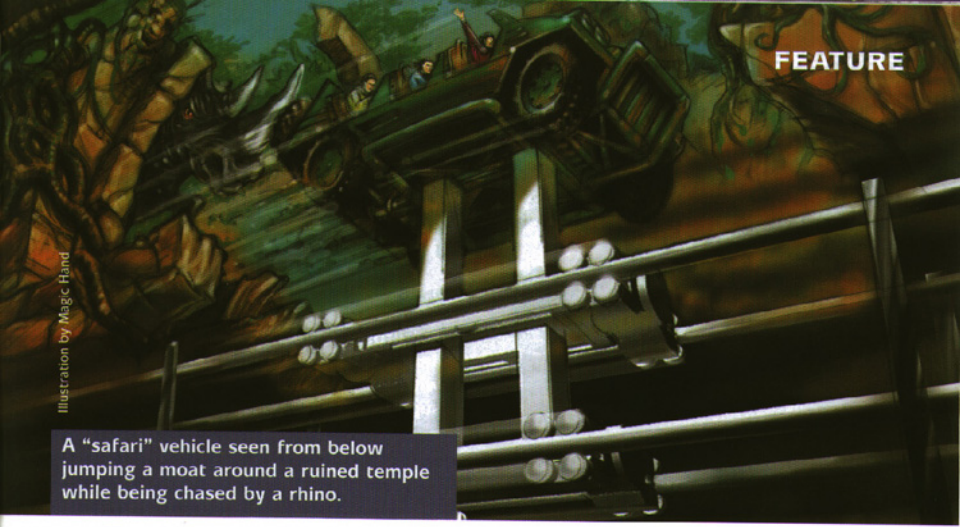

Illustration by Magic Hand

A "safari" vehicle seen from below jumping a moat around a ruined temple while being chased by a rhino.

CANTILEVER COASTERS

THE QUEST FOR THE HOLY RAIL

To date, no amusement ride designer or manufacturer has successfully mastered the concept of a roller coaster based on a cantilever system. As Simon Fowles discovers, one American company may be on the verge of a breakthrough...

THERE are many occasions in history when the most ingenious inventions have been spawned from the simplest of ideas.

Take, for example, a little US brainstorm in 1984 to allow five universities to share the resources of five regional supercomputing centres. This was the germ of a technological marvel that few people on the planet have not heard of, even if they don't personally use it... the worldly weird and wonderful Internet.

Perhaps it's even more of a scientific masterstroke when the concept of a ground-breaking advance in roller coaster technology is born out of a Roadrunner cartoon! But that's exactly what happened to John Hogg, director of design for theming specialist Scenery West, who is the driving force behind a new project to develop a cantilever-based roller coaster or dark ride and the appropriately-titled company behind it, Cantilevered Coaster Systems.

"I first conceived of the concept in 1994 after seeing (once again) the Wile E. Coyote/Roadrunner cartoon where the coyote chases the roadrunner in his Acme Rocket Sled," he said. "Warner Bros. already had a themed coaster based on the idea, but I was thinking of a real environmental ride. I wanted the one where you were launched in the sled on its track, broke loose from the track and actually screamed across that painted, cartoon desert floor, totally out of control, down roads, up the sides of mesas, shooting out into thin air, back down to the desert floor, only to be pitched off the edge of a cliff."

And with that a quest was born.

While not an engineer per se, John Hogg studied a certain amount of physics in college and has spent the past 15 years as a designer in the theme park business. He reckons he has probably learnt more about rides by just being around them in business, while several invaluable lessons in physics have been learned in crashing mountain bikes!

"For this to really work I felt the track would have to be almost invisible," he added. "I started with the vehicle-on-a-stick idea, the stick moving through a slot in the show sets. This idea transmogrified into the CRC concept. Then I realised that in terms of cool ride

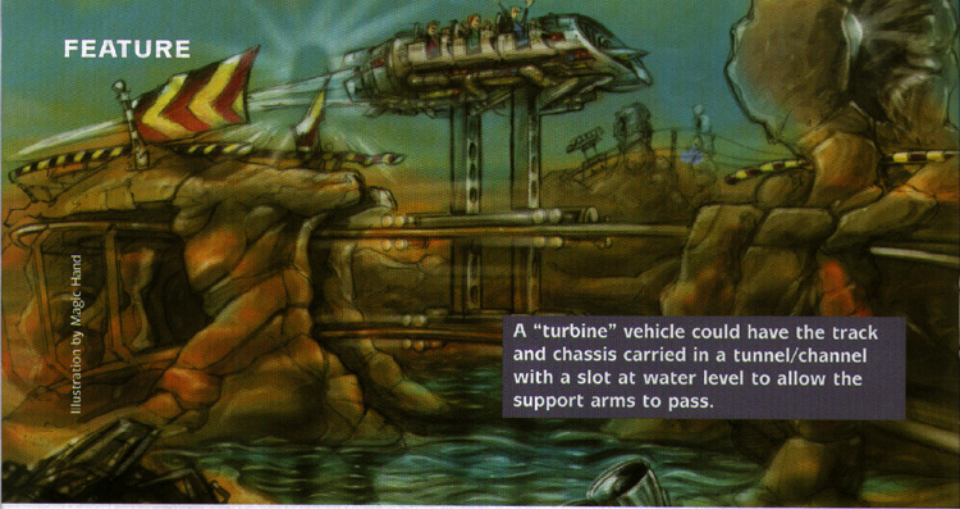

Illustration by Magic Hand

A "turbine" vehicle could have the track and chassis carried in a tunnel/channel with a slot at water level to allow the support arms to pass.

concepts. It wasn't the theming here that was important, but the machine. The same mechanical system could be employed in gobs of different themed situations, each with a different guest experience."

On the face of it, the concept is relatively simple: concealment of the track with vehicles appearing to "fly" passengers around. It took over seven years to fine tune the designs and a US patent was filed in 2001, though the designs have evolved further still by 2004. It is surprising that other designers have either never progressed the idea, or have tried to with little success. As John Hogg is convinced his designs will work, why then, hasn't a cantilever system been developed thus far?

"This could be for two reasons: 1) someone stumbling upon such an idea previously may have considered it too foolhardy to pursue, or 2) this is actually the first time anyone bothered in taking it all the way to patent.

"Frankly during the patent search, I really expected to find someone who had come up with something very similar. There are related inventions, but nothing that really comes close. Arrow Dynamics' (now S&S Power's) X is similar to the CRC in one way in that it uses a second rail set to activate and control an aspect of vehicle movement. In fact, the CRC patent is listed as a prior art patent in the one for X. The Robocoaster is also a distant relation, but there are the obvious differences. Certain suspended coasters also come close, but there's almost always track directly in view.

"Though we have yet to physically prove the CRC, one way or another it should be possible to construct. We just need a manufacturer with an open mind, and who realises just how much variety of applications could be had with a CRC system.

"The patent consists of several configurations with different movement aspects, some of which are rather wacky, especially the one with a support arm with an elbow joint in it. Despite being probably impossible to engineer, I felt it needed to be included in the patent."

Since receiving the patent, CRC has been concentrating on developing the most realistic portions of the concept, and how these might actually be configured to work. A basic model has been constructed using a piece of software called Maya which has helped give better understanding of how the two chassis would behave together over a given section of track.

However, the problem for CRC at this stage is that the concept remains largely untested. The team - currently John and his wife (Barbara Kolo, who has helped with the graphic and web design, as well as research and moral support), but with a ready supply of assistance from engineers, designers, project managers and other professionals - has been in discussion with a number of manufacturers keen to explore the potential. For instance, S&S Power, a company with no shortage of imaginative ride concepts of its own, has expressed interest in developing the project. And, in so doing, would create a ride with several advantages over traditional rides.

"The hidden track aspect is a real major part of this system," asserts Mr. Hogg. "A true flying coaster is something that many people have talked about, and that various manufacturers have tried to pull off. Take X once again as one example of a solution, or Vekoma's Dutchman as another. My personal feeling is that to truly succeed in this quest you have to place the riders in a vehicle and then make the track disappear, or at least get the track way out of the visual way.

"I suppose you could stick a ride vehicle on the end of a stalk of some length, then plug the stalk on to a coaster chassis and call it similar, but the dual track, dual chassis design give the system capabilities that the vehicle-on-a-stick just doesn't have."

The cantilever concept may be applied in a wide variety of uses. In a high-speed configuration utilising traditional gravity power, for example, the CRC system would become a flying, white-knuckle 4-D ride with or without the use of thematic concealment of the track. Combining a high-speed system with theatrical scenery and lighting, especially indoors, could add to the visual impact for observers. Indoors lighting would really come into play, making for easier track concealment and total control of the rider's point of view. Used in a slower speed configuration, the CRC becomes a multi-axis, dark ride system which doesn't require on-board hydraulic or other power, or the requisite computers that control it.

"The CRC's designed ability to vary the roll angle of the ride vehicle via a mechanical linkage to the lower chassis and track, while simultaneously allowing the vehicle to yaw both laterally and vertically relative to the main axis of travel would be something that no other system could pull off. Of course, machinery like the Disney Indy Jones vehicle, or other mobile simulator systems like those used in the Universal Spiderman attractions have a wide range of movement. Trouble is, these are inherently tied to their tracks and can't operate without super complex power and show control systems.

"Granted, both of the rides mentioned

John Hogg.

are two of my absolute favourites. They are incredible inventions. But a similar attraction designed with the CRC system in mind would allow for the vehicle to perform some amazing moves, albeit though not quite the same as either of the other two, but with much less ancillary gear than the others. And, of course, would remove the vehicle from the track."

Encouragingly, in the first four months of the company's website going online (November 2003) outlining the concept it received over 70,000 hits and has been discussed on a number of coaster forums in both the US and Europe. And it's fairly certain that some of the bigger, coaster-oriented parks, such as Cedar Point or Magic Mountain (both US) will be keeping a keen eye on CRC's progress. There were recent enquiries by one large park operator but, says John, they were put off by two words: "prototype" and "development."

It can only be a matter of time before one of the major manufacturers snaps at the chance to develop the cantilever concept assuming, of course, that it is physically capable of being engineered. A working prototype plus plenty of animated visuals would go a long way in convincing operators to take the necessary "leap of faith." But just imagine the possibilities and the whole avenue of new themed rides that could lie in wait were, say, a Warner Bros., Disney or Universal apply their brands to the "flying coaster" concept.

The oddity of CRC's concept is finding adequate support to develop a project which, to riders at least, would in parts actually feel like it has no support... structurally that is.

What is the CRC system?

THE CRC concept centres around a dual track and dual chassis configuration, with the two chassis being arranged one above the other.

The lower chassis anchors the cantilever arms that pass through a gimbaled (independently rotating) bearing system in the upper chassis and support the ride vehicle. The support arms slide back and forth through the upper chassis, which in turn serves as a fulcrum between the lower chassis and the vehicle.

As the vehicle and its two chassis move along the track system, the varying distance of the pairs of rails and their angles to one another control the travel path of vehicle and its riders. The lower chassis may be linked mechanically to the vehicle so that any change in the lower chassis roll angle will cause the vehicle to roll through the same angle.

By having the vehicle "cantilevered" off and away from the track system through the use of the support arms, it becomes possible to conceal the track system from the rider's view. All the loops, spirals, bankings and inversions of current coasters are still possible with the CRC, but are theoretically intensified by its added capabilities.

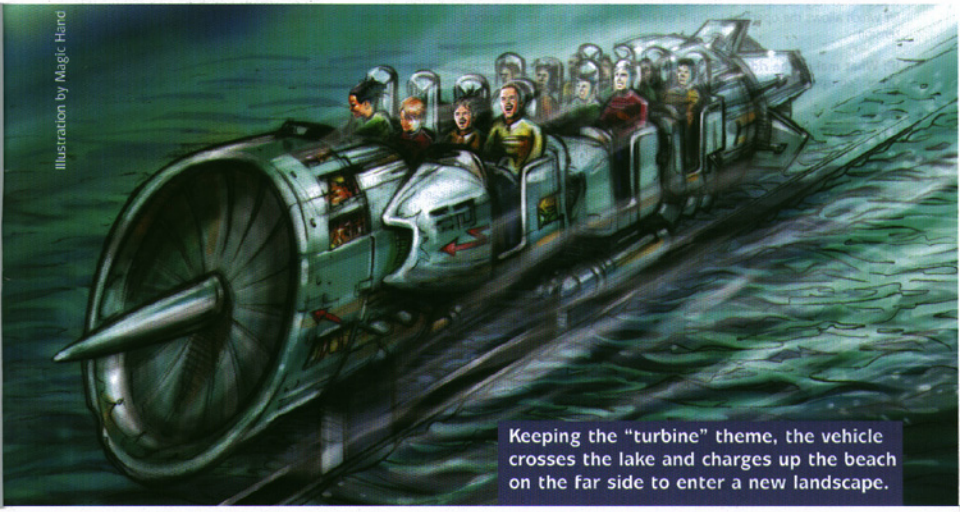

Illustration by Magic Hard

Keeping the "turbine" theme, the vehicle crosses the lake and charges up the beach on the far side to enter a new landscape.