Liaison: Mark Hewett. mark.hewett@whitewaterwest.com

1.0 Introduction

Water-based amusement rides have been a staple in theme parks for decades, providing excitement and thrills for riders of all ages. These rides are generally comprised of dry sections where the ride vehicle travels along wheels, rollers or conveyors and portions in which the vehicle floats in and is conveyed by a trough of flowing water – often referred to as a river section. It is also common for these rides to include thematic scenes conveying a story to riders.

WhiteWater West Industries (WWI) has been a global leader in the design and manufacture of water slides and rides for the amusement industry for over 40 years. We employ over 500 people, with roughly 100 designers, engineers, and draftspersons operating out of our head office in Richmond, BC.

Figure 1 - Shoot the Chute exiting a drop and throwing its iconic splash

Our Water Rides products can be broadly grouped into two categories: Flumes and River Rafts.

In Flume rides, the vehicle has a defined bow and stern area with riders all seated facing the front of the vehicle. The vehicles traverse the rivers in a consistent orientation (either forwards or backwards.)

In River Raft rides, the vehicles are circular with riders seated around the perimeter, facing inwards. The vehicles are free to rotate as they traverse the rivers.

Figure 2 - Examples of Water Rides vehicle ranging from 3m to 6m in length and carrying 4 to 20 riders

2.0 Brief Description

While travelling through a river section, vehicles generally move along at the same speed as the water. However, variations in ride conditions can cause some vehicles to traverse faster than others, potentially leading to clustering of the vehicles at portions of the ride and making it difficult to time thematic scenes. This can negatively impact the riders' experience and operational throughput – key aspects of a successful ride.

To better control the spacing of vehicles within a ride, WWI would like to design a device to capture, hold, and release vehicles within continuously flowing river sections.

Figure 3 - Example of a typical River Raft ride. The device could be located in any of the river sections shown

3.0 Expected Outcomes

The following deliverables would be expected for a successful project:

- Fabrication and assembly drawing package
- CAD models (preferably in SolidWorks format)
- P&ID drawing / schematics (if applicable for designed system)
- Bill of Materials of all mechanical and electrical components, including estimated cost
- Report summarizing the theory of operation, design validation and key calculations

Suggested key project milestones include:

- Requirements and scope definition
- Concept design proposal / selection
- Detail design completion
- Design validation
- Final document delivery

Due to the size of the ride vehicles and river sections, a full-scale prototype is not required or expected. However, the design should be validated through simulation or small-scale mock-ups where possible.

4.0 Resources Available

The Water Rides team has multiple professional mechanical engineers with years of experience in the amusement industry. They are available to guide the design direction, provide product information and amusement ride design standards / best practices.

We have a pool and testing facility in Richmond that could potentially be used for small-scale mockups or equipment assembly.

We can also provide CAD models of vehicles and trough sections for use in the design of the device.

This is a great opportunity for students with an interest in the amusement industry to work closely with professional engineers and learn about the design process of these rides.

5.0 Requirements

Functional requirements of the device:

- Automatically capture and hold approaching vehicles
- Dispatch / release the vehicles via remote control
- Must withstand the impact of a subsequent vehicle colliding with the vehicle being held
- Must comply with Amusement Ride Standards (ASTM F2291-20)

Desired features:

- Accelerate the vehicles up to the same speed as the river upon release
- Located entirely underwater / invisible to riders

Key considerations:

- Rider Safety – All hazards associated with the device should be considered and mitigated appropriately. Consideration should be given to rider egress/evacuation.
- System Cost / Complexity – Minimized to achieve the desired function.
- Environment – The device will operate outdoor in chlorinated water.
- Aesthetics – The design should be minimally intrusive and not interfere with the ride experience
- Ride Control System Integration – The device must be controllable through the ride PLC.
- Scalability / configurability – Can the same design be applied and used on all ride vehicles within the Water Rides portfolio? Two different designs may be required to accommodate Flume and River Raft rides

Designs exist for similar devices from other amusement ride manufacturers, each of which come with their own advantages and disadvantages. Research should be conducted into existing designs and applicable patents to avoid infringement and help rank potential design concepts.

Useful References:

Water Rides product portfolio: https://www.whitewaterwest.com/en/products/water-rides/

Patent for similar device:
https://patents.google.com/patent/US20200179816A1/en?q=boat+capture+launch+system&oq=boat+capture+and+launch+system