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Roller Coasters: Background and Design

Spring 2015

Week 6 Notes

### Modern Manufacturers

So last week, we discussed many important early roller coaster manufacturers, but most of them (except PTC and Vekoma) don't exist today. This week, we will discuss the currently industry leaders, as well as a few other large / notable manufacturers

#### Intamin AG

- Intamin (abbreviation for International Amusement Installations) is one of the two most prominent steel coaster manufacturers today
- A Swiss company, they were founded in 1967 and begun building flat rides like observation towers
- They began their move into the roller coaster world by serving as an intermediary for Schwarzkopf when selling rides in America. Over time, they began building their own creations
- Their first coaster was only 19ft tall (Jr. Gemini at Cedar Point; ironically, 34 years later, they would add a coaster nearby that stood 400ft taller)
- One of their employees, who also worked with Schwarzkopf, was Werner Stengel, the greatest steel coaster designer in the world. He has had his hand in over 500 roller coaster projects and was behind such innovations as the modern vertical loop and heartlining. He later went on to form Ing.-Büro Stengel GmbH, a German company that designs most major steel coasters today, including those made by Intamin and B&M
- They perfected the stand-up coaster, originally invented by Togo in 1982, with the Shockwave at Six Flags Magic Mountain
  - The ride was actually designed by B&M, when they still worked at Intamin
- Their first popular model was the 'Mega Coaster' line starting in 1999, which were custom designed hyper coasters usually featuring out and back layouts with large helices. Notable examples include Bizarro at Six Flags New England and Goliath at Walibi Holland
- In 2000, Intamin became the first manufacturer to break the 300ft barrier with Millennium Force at Cedar Point, the world's first giga coaster
- In 2003, they broke the 400ft barrier at the same park with Top Thrill Dragster, the world's first strata coaster. Two years later, they went even taller with Kingda Ka at Six Flags Great Escape which stands 456ft tall and is currently the tallest coaster in the world
- They commonly make launch roller coasters, including over 10 'Accelerator Coasters', which use hydraulic launches and feature top hats or figure-8 layouts. One of these, Formula Rossa at Ferrari World Abu Dhabi, is the fastest coaster in the world at 149mph. Occasionally, they'll use LIM/LSM launches, like on Volcano: The Blast Coaster at Kings Dominion or Maverick at Cedar Point
- Recently, they have a model line called 'Mega-Lites', which are only 100ft tall, but feature intense airtime-packed layout which earn them high positions on coaster rankings
- They also manufacture 4<sup>th</sup> Dimensional coasters called 'ZacSpins' which differ from Arrow/S&S 4<sup>th</sup> Dimension coasters like X2 and Eejanaika by allowing the cars to freely rotate head over heels

- On a side note, Intamin also makes non-amusement rides such as transportation systems. For example, they made the Moscow Monorail.

### Bolliger & Mabillard (B&M)

- B&M is the other most prominent steel coaster manufacturer in the world today.
- A Swiss company, they were founded in 1988 by Walter Bolliger and Claude Mabillard, former employees of Intamin (actually, they worked for Giovanola, but we won't cover them) who worked on their stand-up coasters. They started their company in an attempt to leave the amusement industry, but they were contracted by Six Flags to make Iron Wolf at Six Flags Great America, and got sucked back in
- The firm came to the foreground of the industry with their invention of the inverted coaster for Batman: The Ride at Six Flags Great America in 1992. The small, forceful ride received wide acclaim and was copied 11 times at other parks, most Six Flags
- They also received notice for Kumba, a sit-down coaster built at Busch Gardens Tampa in 1993. The coaster followed what I call the 'B&M' formula: lift hill around 150ft, vertical loop, dive loop, zero-G roll, cobra roll, mid-course brake run (MCBR), interlocking corkscrews. Many B&M rides follow this formula for their layouts, or a slight derivative
- In 1999, they began manufacturing hyper coasters with Apollo's Chariot at Busch Gardens Williamsburg. Like Intamin, their hyper coasters featured out-and-back layouts normally and focused on big hills and helixes
  - In 2012, they went over 300ft for the first time with Leviathan at Canada's Wonderland
- Also in 1999, they invented the floorless coaster, which is like a normal sit-down coaster but with no floor between the riders' feet and the track, which heightens the sense of speed and danger
- In 2002, they improved on Vekoma's flying coaster concept, where riders sit in a laying-down position, which allows the track to either be above or below riders. Their most famous flying coaster is Tatsu at Six Flags Magic Mountain
- Their current primary model line is the Wing Coaster, which is similar to 4D coasters in that riders sit on the side of the track rather than above or below, but the cars are fixed and do not rotate. 6 have been built in the last 3 years.
- Up until 2015, no B&M coaster featured a launch section and all had normal chain lift hills, with the exception of Incredible Hulk at IOA. In 2015, B&M will open Thunderbird at Holiday World, a Wing Coaster with a LSM launch.

### Vekoma

- As a reminder from the early manufacturers lecture, Vekoma is a Dutch manufacturer which came on the scene in 1979. They became famous by two major model lines, the Boomerang and the SLC, which each were cloned over 30 times around the world.
- At the turn of the millennium, Vekoma went on a binge of developing new styles of rides, including the Giant Boomerang, LSM launch coasters, Flying Dutchman, and even wooden coasters. This over-extended them and forced them into bankruptcy in 2002. They were able to survive by making Boomerangs and SLCs.
- Since recovering, Vekoma has slowly begun to develop more coasters, and are starting to move towards a more B&M / Intamin design style.

### Great Coasters International (GCI)

- One of the two prominent wooden coaster manufacturers today; an American company (most wooden companies are)
- Started in 1994 by Mike Boodley and Clair Hain Jr, the former of which was previous a designer for CCI. Their first coaster, the Wildcat at Hersheypark, was built in 1996
- GCI is known for having coasters with sweeping drops and turns and lots of crossover elements, which is inspired from prolific designers in the 1920s like Fred Church and Harry Traver (the first drop on many GCI coasters looks like the first drop on the Crystal Beach Cyclone)
- A famous feature of theirs is the station fly-through, where a section of the rides track actually goes through the station right near patrons waiting to get on. First featured on Thunderhead at Dollywood in 2007, it is now common elsewhere.
- GCI coasters do not use PTC rolling stock like most other wooden coasters, but rather custom designed trains called 'Millennium Flyers', which feature single row articulated cars. You can usually notice them by looking for an open grate at the front of the train.

### The Gravity Group (TGG)

- The other big wooden manufacturer today
- After CCI's bankruptcy in 2002, some of the main designers got together and formed The Gravity Group
- Their first coaster was Hades at Mt. Olympus Water and Theme Park in the Wisconsin Dells. It is unique in that it features a 800ft long tunnel which travels under the park's parking lot
  - For the 2013 season, TGG is modifying the ride to add a corkscrew, TGG's first inversion
- The next year, they built the Voyage at Holiday World. The ride featured rave reviews and is often called the #1 wooden coaster in the world
- TGG coasters are highly unique, but a common feature is 90 degree banked turns, something not found in any other wooden coaster
- In 2012, they built Dauling Dragon at Happy Valley in China, a dueling coaster which featured a 'high-five' element, which banks the two tracks at 90 degrees towards each other so that the riders can high five each other (they can't really, but it's cool)
  - Search 'dauling dragon pov' on Youtube and watch the Theme Park Review video. It's really cool!

### An Interesting Note about Wooden Coaster Designers

- There exists a cool (and sorta eerie) chain that connects all major wooden coaster designers from the 1880s to today
  - La Marcus Adna Thompson invents the wooden coaster in the 1880s
  - John Miller becomes LA Thompson's chief engineer and builds his rides
  - Herbert Schmeck learns from John Miller while the latter worked at the PTC
  - John Allen was an apprentice of Herbert Schmeck and went on to revitalize the coaster industry in 1972 with the Racer
  - Charlie Dinn worked with John Allen on the Racer and used what he learned when building the Beast at Kings Island and other coaster by Dinn Corp
  - Denise Dinn, daughter of Charlie Dinn, worked for her father before forming CCI
  - Today's two major wooden coaster builders, GCI and TGG, both feature designers from CCI

## Other Manufacturers

- There exist many other manufacturers beyond the ones mentioned here. Some are small and build very few coasters, other more major. A few are mentioned here (some might be mentioned in more detail next week)
- **Mack** (formally Mack Rides GmbH & Co KG) is a German steel coaster manufacturer who has built over 100 roller coasters. They originally were famous for their Wild Mouse coasters, but have recently branched out into larger installations. They also have atypical coaster systems, like their bobsled coaster, water coasters, and powered coasters
- **Maurer Söhne** is a German steel coaster manufacturer who also makes Wild Mouse coasters as well as a model line they call X-Car coasters, which have strange features like looping lift hills (see G-Force at Drayton Manor)
- **Gerstlauer** is a German steel coaster manufacturer originally associated with Schwarzkopf (and acquired many of their resources after their bankruptcy). They are known for their 'Eurofighter' coasters, a style of sit down coaster that have vertical lift hills or LSM launches
- **Chance Morgan** is a defunct American steel coaster manufacturer started by Dana Morgan, the son of Arrow Dynamics founder Ed Morgan and former president of Arrow. He built a handful of high quality hyper coasters in the late 1990s before ceasing production. They recently have resurfaced with Lightning Run at Kentucky Kingdom in 2014
- **S&S Worldwide** (previously S&S Power and S&S Arrow) is an American steel coaster manufacturer who acquired Arrow Dynamics assets when they went bankrupt in 2002. They originally were only interested in making Arrow's 4D coasters, but have recently branched out with their El Loco model and launched coasters in China
- **Premier Rides** is an American steel coaster manufacturer which invented the LIM launch system in 1996. They built around 6 LIM coasters, didn't really produce any coasters for about 5 years, and has recently begun making many new coasters, including 5 projects in 2013 alone
- **Zamperla** is an Italian steel coaster manufacturer which doesn't really make major installations, but has tons of smaller scale family coasters. They also produce many flat rides

Summary Table for All Manufacturers discussed

<b>Name</b>	<b>Wood or Steel*</b>	<b>Country of Origin</b>	<b>Years of Primary Operation**</b>	<b>Operating or Defunct</b>
Arrow Dynamics	Steel	American	1960s – 2002	Defunct
B&M	Steel	Swiss	1990 – Current	Operating
CCI	Wood	American	1992 – 2002	Defunct
Dinn Corp	Wood	American	1989 – 1991	Defunct
GCI	Wood	American	1996 – Current	Operating
Gerstlauer	Steel	German	1998 – Current	Operating
Intamin	Steel	Swiss	1979 – Current	Operating
Mack	Steel	German	1960s – Current	Operating
Maurer Söhne	Steel	German	1996 – Current	Operating
Chance Morgan	Steel	American	1996 – Current	Operating
Premier Rides	Steel	American	1996 – Current	Operating
PTC	Wood	American	1920s – 1970s	Defunct (coaster-wise)
S&S	Steel	American	2001 - Current	Operating
Schwarzkopf	Steel	German	1960s – 1990s	Defunct
TGG	Wood	American	2005 – Current	Operating
Togo	Steel	Japanese	1950s – 2000	Defunct
Vekoma	Steel	Dutch	1979 - Current	Operating
Zamperla	Steel	Italian	1980s – Current	Operating

\*Primarily; occasionally they might spill over into the other type

\*\*When they were making many coasters; they may have been operating before and after this range