Tranan
Tranan
Tranan
## Tranan - Skara Sommarland

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel - ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Operating</td>
</tr>
<tr>
<td>Opened</td>
<td>2009</td>
</tr>
<tr>
<td>Mfr.</td>
<td>S&amp;S Worldwide</td>
</tr>
<tr>
<td>Height</td>
<td>65.6 ft</td>
</tr>
<tr>
<td>Length</td>
<td>1640.4 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>24.9 mph</td>
</tr>
</tbody>
</table>
Identification; Inversions; Roller Coaster Failures

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Wood or Steel
Wood or Steel - Wood

- Look at the track for layers of laminated wood
- Also, you can look for catwalks
Wood or Steel - Wood

- Most use PTC rolling stock ("box cars")
- Some exceptions
Wood or Steel - Steel

- If it isn’t wood, it’s steel
- Look for tubular rails, or flat I-Beam track
- If tubular supports, steel (reverse not true)
Wood or Steel - Hybrids

- Whether a track is wood or steel depends on the track, NOT the supports
- If the supports are not the same as the track, then the coaster is called a Hybrid coaster
Wood or Steel - Odd Cases

- RMC’s Iron Horse Track System
Wood or Steel - Odd Cases

- RMC’s Track Topper
Manufacturers
Identification - Good Identifiers

• Spine

<- Truss
Round ->

<- None
Box ->
Identification - Good Identifiers

• Ties

Outside

Inside
Identification - Good Identifiers

- Supports

Tubular

Box

Truss
Identification - Good Identifiers

- Trains

2 rows per car, 2 abreast (2x2) 1 rows per car, 4 abreast (1x4)
Manufacturer - Arrow

- Track: round spine, outside ties
Manufacturer - Arrow

- Supports: Truss (‘wood’) supports, along with tubular
Manufacturer - Arrow

- Trains: 2 rows of 2, torpedo nose on loopers
Manufacturer - Schwarzkopf

- Hard to identify by track and trains; focus on layout and design
- Shuttle Loops
Manufacturer - Schwarzkopf

- Portable Coasters - Look for tight, oval footprint, steep turning drops, and vertical loops
Manufacturer - Schwarzkopf

- **Vertical Loops** - Distinctive box support and spine, or truss support
Manufacturer - B&M

- Track: Box spine, inner ties
- Should be easy to identify
Manufacturer - B&M

- Trains: 4 across, many types, same style
Manufacturer - Intamin

- Track: Truss or double spine with inner ties
Manufacturer - Intamin

• Supports: truss, box, usually tubular
Manufacturer - Vekoma

- Track: Same as Arrow
- If inverted, then definitely Vekoma
Manufacturer - Vekoma

- Boomerang
Manufacturer - Vekoma

- Suspended Looping Coaster (SLC)
## Summary - Steel

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Spine</th>
<th>Ties</th>
<th>Supports</th>
<th>Trains</th>
<th>Extra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow</td>
<td>Round</td>
<td>Outside</td>
<td>Truss, tubular</td>
<td>2x2 cars, torpedo nose</td>
<td>Usually easy to identify</td>
</tr>
<tr>
<td>Schwarzkopf</td>
<td>Round, None</td>
<td>Inside</td>
<td>Intricate tubular</td>
<td>2x2 cars, box</td>
<td>Portable coasters, shuttle coasters, distinctive loops</td>
</tr>
<tr>
<td>B&amp;M</td>
<td>Box</td>
<td>Inside</td>
<td>Tubular</td>
<td>1x4 cars</td>
<td>Easy to identify</td>
</tr>
<tr>
<td>Intamin</td>
<td>Truss or double round</td>
<td>Inside</td>
<td>Truss, tubular, box</td>
<td>2x2 cars, sleek</td>
<td>Distinctive OTSRs</td>
</tr>
<tr>
<td>Vekoma</td>
<td>Round</td>
<td>Outside</td>
<td>Truss, Tubular</td>
<td>2x2 cars</td>
<td>Boomerangs, SLCs, Inverts</td>
</tr>
</tbody>
</table>
Manufacturer - GCI

- Look for sloped supports and crossovers
Manufacturer - GCI

- Trains: Millennium Flyers
Manufacturer - CCI / TGG

- Look for stair-step supports
Types

- Review Week 1 slides
Inversions
RCT Model of Inversions

- Three half-inversion building blocks: half loop, half corkscrew, and half barrel roll
RCT Model of Inversions

- Can represent the 8 “basic” inversions*

  - Vertical Loop
  - Corkscrew
  - Cobra Roll
  - Batwing

  - Dive Loop
  - Immelmann
  - Heartline / Barrel Roll
  - Zero-G Roll

*This is an extremely B&M centric view on inversions
Inversions - Vertical Loop

- Two half loops
Inversions - Corkscrew

- Two half corkscrews
Inversions - Wing Over

- Corkscrew on an inverted coaster
Inversions - Cobra Roll

- Half loop into two half corkscrews into half loop
Inversions - Batwing

- Half corkscrew into two half loops into a half corkscrew
Inversions - Dive Loop

- Hill, half barrel roll, half loop
Inversions - Immelmann

- Reverse dive loop; half loop, half barrel roll, hill
Inversions - Heartline/Barrel Roll

- Two half barrel rolls
Inversions - Zero-G Roll

- Hill, two half barrel rolls, hill
8 Basic Inversions

Vertical Loop               Corkscrew               Cobra Roll                Batwing

Dive Loop                   Immelmann               Heartline / Barrel Roll    Zero-G Roll
Other Inversions
Inversions - Double/Triple/Quad

- Repeating inversions
Inversions - Sea Serpent / Roll Over

- Like a cobra roll, but same direction corkscrews
Inversions - Norwegian Loop

- A dive loop into an immelmann
Inversions - Pretzel Loop

- ‘Upside-down’ Loop; enter from the top
Inversions - Inclined Loop

- Loop at an angle
Inversions - Interlocking Corkscrews

- A corkscrew followed by a sharp turn into another corkscrew
Inversions - Dive Drop

- Common first drop on B&amp;M Wing Coasters
Inversions

• There are more inversions that what has been mentioned here; these are just the more common / distinctive ones
• Example: This one is called a “Bent Cuban 8”
Roller Coaster Failures
The Bat - Kings Island
World’s first* suspended coaster; exciting ride; well received
# The Bat - Kings Island

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel - Suspended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Removed</td>
</tr>
<tr>
<td>Opened</td>
<td>1981</td>
</tr>
<tr>
<td>Closed</td>
<td>1983</td>
</tr>
<tr>
<td>Mfr.</td>
<td>Arrow</td>
</tr>
<tr>
<td>Height</td>
<td>100 ft</td>
</tr>
<tr>
<td>Length</td>
<td>2456 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>35 mph</td>
</tr>
</tbody>
</table>
The Bat - Kings Island
Two lifts; focus on turns
The Bat - Kings Island

Frequent mechanical issues from track not being banked
The Bat - Kings Island

- More strain from brake fins being on bottom of train
- Only operated for two seasons
  - Closed due to high cost of maintaining it
- Arrow fixed issues on future suspended coasters
Drachen Fire - Busch Gardens Williamsburg
<table>
<thead>
<tr>
<th>Type</th>
<th>Steel - Sit Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Removed</td>
</tr>
<tr>
<td>Opened</td>
<td>1992</td>
</tr>
<tr>
<td>Closed</td>
<td>1998</td>
</tr>
<tr>
<td>Mfr.</td>
<td>Arrow</td>
</tr>
<tr>
<td>Height</td>
<td>150 ft</td>
</tr>
<tr>
<td>Length</td>
<td>3550 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>60 mph</td>
</tr>
</tbody>
</table>

Drachen Fire - Busch Gardens Williamsburg
Drachen Fire - Busch Gardens Williamsburg

Famous first inverson; a wrap around corkscrew (one of many remnants of B&M origin)
Drachen Fire - Busch Gardens Williamsburg
Drachen Fire - Busch Gardens Williamsburg

Immediate complaints of rough ride
Drachen Fire - Busch Gardens Williamsburg

After 1994, corkscrew after MCBR removed in effort to make bearable
Drachen Fire - Busch Gardens Williamsburg

Closed in 1998, scrapped in 2002 when no one else bought it
Drachen Fire vs. Kumba

Drachen Fire such a failure while sister coaster Kumba at BGT was a smashing success (death knell for Arrow)
# Drachen Fire vs. Kumba

<table>
<thead>
<tr>
<th></th>
<th>Drachen Fire</th>
<th>Kumba</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Steel - Sit Down</td>
<td>Steel - Sit Down</td>
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<tr>
<td>Status</td>
<td>Removed</td>
<td>Operating</td>
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<tr>
<td>Opened</td>
<td>1992</td>
<td>1993</td>
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<tr>
<td>Closed</td>
<td>1998</td>
<td></td>
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<tr>
<td>Mfr.</td>
<td>Arrow</td>
<td>B&amp;M</td>
</tr>
<tr>
<td>Height</td>
<td>150 ft</td>
<td>143 ft</td>
</tr>
<tr>
<td>Length</td>
<td>3550 ft</td>
<td>3978 ft</td>
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<tr>
<td>Speed</td>
<td>60 mph</td>
<td>60 mph</td>
</tr>
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</table>
Windjammer - Knott’s Berry Farm
# Windjammer - Knott’s Berry Farm

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel - Sit Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Removed</td>
</tr>
<tr>
<td>Opened</td>
<td>1997</td>
</tr>
<tr>
<td>Closed</td>
<td>2000</td>
</tr>
<tr>
<td>Mfr.</td>
<td>Togo</td>
</tr>
<tr>
<td>Height</td>
<td>69 ft</td>
</tr>
<tr>
<td>Length</td>
<td>1839 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>40 mph</td>
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Windjammer - Knott’s Berry Farm

- Tons of mechanical issues
  - Mis-aligned track
  - A mild breeze could keep the trains from completing the circuit
- Very uncomfortable cars
- Knott’s sued Togo; bankrupted the Japanese manufacturer
Son of Beast - Kings Island

The biggest failure
Son of Beast - Kings Island

Wanted a record breaking woodie to go along with The Beast (1979, pictured below)
Son of Beast - Kings Island
### Son of Beast - Kings Island

<table>
<thead>
<tr>
<th>Type</th>
<th>Wood - Sit Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Removed</td>
</tr>
<tr>
<td>Opened</td>
<td>2000</td>
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<tr>
<td>Closed</td>
<td>2009</td>
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<tr>
<td>Mfr.</td>
<td>RCCA</td>
</tr>
<tr>
<td>Height</td>
<td>218 ft</td>
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<tr>
<td>Length</td>
<td>7032 ft</td>
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<tr>
<td>Speed</td>
<td>78 mph</td>
</tr>
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Son of Beast - Kings Island

World’s first (modern) looping wooden coaster
Son of Beast - Kings Island

Truly massive
Son of Beast - Kings Island
Began getting rough quickly; “accidents” in 2006 and 2009
Son of Beast - Kings Island - Why It Failed

Built by RCCA, which had a reputation of poor construction quality (they got fired halfway through)
Son of Beast - Kings Island - Why It Failed

Designed like a steel coaster
Son of Beast - Kings Island - Why It Failed

Trains were heavy to make it though the loop; uncomfortable restraints
Son of Beast - Kings Island
Removed in 2012
Next Week - Coaster Physics

- All about G-Forces
- Energy calculations (height and speed)
- Curve and force calculations