

**Dear Readers,**

MAURER SÖHNE's amusement division has developed at a rapid pace as you will see from our new company periodical Xpress. Read all about it in the following pages and gain an insight into our innovative developments and current projects.



**Xpress is Xtended**

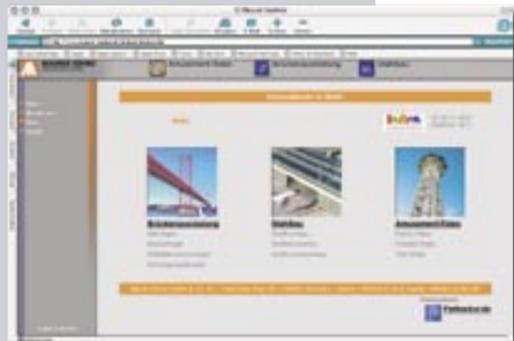
All of our products, from roller coasters, and towers to water rides, are backed up by MAURER SÖHNE's unique Xtended philosophy. Xtended simply means "more", and that is precisely what you can expect from our Xtended rides: more potential, more exciting highlights, more fun for the visitors, more success for your amusement park. The same applies to our latest offspring which you are reading right now, Xpress: take a look!

Wishing you lots of fun and every success!

Jörg Beutler, Managing Director  
MAURER SÖHNE

[www.MAURER-soehne.de](http://www.MAURER-soehne.de)

Over the summer, MAURER SÖHNE has completely reworked its website. The Munich-based company's Internet presence is clearly structured and vividly brought to life with a large number of illustrations. One successful solution is the separation of general information about the company on the one hand, and the individual divisions with their respective product ranges on the other.



"General" site navigation is assigned to the left-hand side of the screen with the standard headings "Home", "About us", "News" and "Contact". Here, the surfer will find information about the company's history, its management, addresses, sketch maps showing where to find it, and press releases.

The main navigation across the top of the screen distinguishes between the divisions "Amusement Rides", "Bridge Equipment" and "Constructional Steelwork". The sub-navigation then appears on the left, clearly set apart from the general navigation, and provides access to information about the product range. □



Revolutionary new development: the X-Car with XSeats tackles the tightest of curves, humps and valleys, and allows inverted figures and negative g forces without the need for shoulder restraints.

## Freedom on tracks Revolutionary new development

Speed and acceleration – the heart and soul of roller coasters. Every roller coaster enthusiast longs for a taste of freedom and the chance to defy gravity. However, most people regard the necessary safety systems as annoying, preventing them from having fun. With speed, acceleration and ride elements becoming more demanding for the ride layout, the sense of freedom is restricted accordingly by the restraint systems which are indispensable for safety.

How can we cope more effectively with these two conflicting needs: desire for freedom and safety requirements? In order to satisfy both these needs, MAURER SÖHNE started to look for a solution in the summer of 2002.

### From the idea to the innovation

The company got in touch with experts from the famous Institute of Ergonomics at the Technical University of Munich. The partners involved quickly found a common basis, not least due to the large experience of the Institute, which had already participated in the development of different kinds of seats for buses and aircraft, and for companies working in the field of astronautics. This was the beginning of a joint development project. Shortly afterwards, other partners joined the project: a well-known design office and the safety experts from the German Safety Authority TÜV in Munich.

The aim was to find a viable and safe solution. Research was carried out into anthropology, mechanical restraint structures and mechanisms, and the shape of the seat itself. The fundamental concepts and the final implementation led to an extensive patent application.

### Slim – heavy – big

Various seat and restraint prototypes were tested, involving a large number of people taking part in the testing. These included slim children only 1.10 m (43") tall as well as slim, sporty people of average size, very



Testing of the seat with a wide spectrum of different kinds of people. The photo on the right shows the seat with a small girl (approx. 1.10 m (43") in height), unable to get out of the seat on her own or be thrown out by dynamic forces, even with the restraint in the most unfavorable position.

heavy but short adults and very large people. The final design of the seat combination was particularly influenced by safety considerations. The strictest and most restrictive requirement was for the seat to hold even the smallest child

firmly in place, even with the restraint in an unfavourable position, so that it cannot get out of the seat on its own, or be thrown out by dynamic forces.

### TÜV certification for the new X-Seat

The most important improvement over existing systems was the evaluation of a geometric position for the restraint which has more-or-less identical fixing properties with regard to very slim and very large people. This unique property of the restraint system reduces the free space between lap bar and backrest, both longitudinally and laterally. This feature ensures that large people and very slim people are held equally safely.

The combination of these measures and

spring of 2003, TÜV certification was completed successfully and the new X-Seat, as it was then renamed, was authorized for persons of 1.20 m (47") to 2 m (79") in height. In an adapted version, the seat was even authorized and proved safe for children of 1.10 m (43") in height.

### Only a few bolts and an electric plug

To make the development suitable for universal applications, further changes have been made to the new seat so as to create an independent seat safety unit, including locking and unlocking, safety control systems and emergency release functions. The seat unit is connected to the car body by means of just a few bolts and an electric plug. The seat is thus highly flexible in terms of possible applications. →



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### TÜV safety certificate

MAURER SÖHNE is the first manufacturer in the world to be awarded certification by TÜV Süddeutschland for the production of amusement rides. Until now, in this field, only the Europapark in Rust has held this TÜV safety certificate. This safety seal documents TÜV's external monitoring of MAURER SÖHNE's production in respect of all safety-related norms. MAURER SÖHNE will be displaying the certificate to the public at the IAAPA in Orlando (19-22 Nov., booth no. 3811).



## Like Flies in a Spider's Web Lagoon Park with MAURER Spinning Coaster

On April 19th, exactly on schedule, Lagoon Park, the legendary family park in Farmington, Utah opened its new coaster attraction, the "Spider". The name and the theme were inspired by the unique feature of this new Spinning Coaster, in which eight single coaches with four seats whirl around in the ride like flies caught in a spider's web. Riders approaching the entrance to the coaster have to pass beneath a large black widow spider. They then proceed

### The first Spinning Coaster in the USA

The new MAURER Xtended SC 2000 Spinning Coaster is the eleventh of a total of fourteen Spinning Coasters sold, but the first one in the USA. Mr. David Freed, the park owner, finally chose this ride from MAURER SÖHNE on the basis of his positive experiences with, and the good maintenance record of, the Wild Mouse he purchased from the same manufacturer in 1997.

The MAURER Xtended SC 2000 is quite a compact family coaster with a base frame size of only 150 x 80 ft (46 x 24 m), but it features all the thrilling ride elements of a great coaster along its 1400 ft (427 m) of track. After leaving the chain lift at a top height of 53 ft (16 m), the four-seater cars, with the spinning function still blocked, race through a first steep drop to a high-level hairpin curve where spinning is released.

### Spinning makes orientation difficult

Since the spinning is generated by centrifugal forces alone, the riders, seated back-to-back and facing outwards, have little chance to get their bearings while swirling through a high 90 degree banked switchback turn, called the "Immelmann", through a ski-like slalom, a carousel and other curves. Free spinning is a chaotic system, dependent on current load and track conditions, so every ride is a unique experience. However, to make sure the ride does not become too wild and uncomfortable, and to keep this family coaster suitable for kids of 46 inch (117 cm) in height, spinning is limited by means of specially engineered rotation brakes to a maximum of about 30 rotations per minute. Moreover, the cars are automatically aligned and locked before entering the loading area in the station. Maximum capacity is 900 riders per hour. All recent safety regulations, such as DIN 4112 and forthcoming EN and ASTM standards, have been taken into account in the design of this new coaster. Before shipping, it was fully erected at MAURER's plant for testing and certification by the TÜV (German technical inspectorate) in Munich and checked for acceptance by the engineering staff of Lagoon Park. Due to its steel base frame, the ride took just three weeks to

erect on the concrete slab at its site in the park, including all infrastructure work for the public guidance and power supply carried out by Lagoon Park staff.

### Successful cooperation

It was only possible to achieve this very short commissioning on-site because of the extraordinarily well-planned, organized and experienced cooperation of the crews of both the manufacturer and the park. It appears that cooperation between well-meaning American and German people still works successfully on the small scene. □



With its brilliant red and purple structures, the Spider is a remarkable eye-catcher.



There are flies stuck to the outside of the Spider cars.



In the Xtended Spinning Car, the passengers sit back-to-back.

through a forest park, where the queue leads them past old trees, before entering a small stone-built castle with an internal spiral staircase that takes them over a bridge and into the station. All fences and railings are nicely integrated into the theme with small baby spiders like the big one, and the cars have a great airbrush design as flies. The new coaster is located between the White Wooden Coaster and the Colossus, just opposite the parking lot alongside freeway I 15, and its brilliant red and purple structures make it the new eye-catching attraction at Lagoon Park.



A unique high-quality family roller coaster with rotating cabins: Wuzetown, consisting of two Spinning Coasters 3000 in Phantasialand.

## More Fun in the Park Dual Spinning Coaster 3000 in Phantasialand

At the beginning of the 2002 season, a new chapter in the history of roller coasters was written. The customer's specifications had not been to develop a higher or faster roller coaster; the top priority was to design a unique, high-quality family roller coaster with rotating cabins. MAURER's engineers were given the chance to allow their creativity free rein. The only natural limits they had to take into account were the dimensions of the hall. The result: a genuinely novel sensation that the world had not seen before. From MAURER's "Xtended" product range, two dueling Spinning Coasters have emerged with differing track layouts. Phantasialand would not be what it is today if its focus were not on high-quality theming. This is how the realms of fantasy around Wuzetown have now melted into one with the Spinning Coaster. The passengers, seated in rotating 4-person cabins, are delighted by the continuous kaleidoscope of impressions and surprises and experience a breath-taking ride.

### Gap at the end of the tracks

Roller coaster rails are normally one continuous track from the beginning to the end, but this principle has been thrown overboard in the case of the Xtended SC 3000! What does this mean? The tracks suddenly stop, as if they have simply come to an end in midair, and it seems as if the ride will not continue ... but within seconds the passenger realizes the solution. Novel systems, specially developed for this Spinning Coaster, transport the rotating cabins across the gap from the end of one track to where the next track starts. After this surprise, the rotating cabins continue from this new position. Furthermore, differently configured, breathtaking effects on each track guarantee a spine-chilling ride, increasing tension and generally enhancing the attractiveness of this indoor sensation.

### Start in the vertical lift

The ride through these realms of fantasy begins in the vertical lift. Here, the cabin is raised to a new position as if by some ghostly hand and the ride gets off to a breathtaking start with the first drop. Further figures during the ride include extremely steep curves, slaloms, gyroscopes and camelbacks. And at the end of the ride there is one last surprise ... TÜV-Bayern and the Werner Stengel engineering office were incorporated into the project at an early stage in the planning phase. On a track covering a total length of approx. 1,000 m (3,300 ft), the two Xtended Spinning Coaster vehicles offer the 1,500 guests (per h) a ride with unique sweeping experiences. In each spinning coaster, up to 7 cabins move simultaneously. These freely rotating cabins ensure that each ride will be a unique experience. The distribution of weight in the gondolas influences the direction of rotation as well as the speed of rotation. □

## Industrial robots for amusement parks

### MAURER Xtended RoboTower: unpredictable motions in every direction

MAURER SÖHNE offers a revolutionary new type of ride in the shape of the MAURER Xtended RoboTower: this ride combines the freely programmable motion of 13 robots with the competence in steel construction that characterizes this ride producer. For this innovative ride, MAURER SÖHNE has used tried-and-tested industrial robots of which over 35,000 are already in operation worldwide. In the place of tools or grippers, the designers fitted the high-performance robots with twin seats and installed 13 of them on a steel construction 28 meters (92 ft) wide and over 30 meters (98 ft) tall: the MAURER Xtended RoboTower was born.

### Moves freely in space

Passengers in the Xtended RoboTower are not simply moved up and down, to and fro, back and forth or round in circles. The individual robots have full mobility in six axes and convey their passengers freely through space. The direct transmission of power makes for a very direct ride experi-

ence, but alongside extreme ride effects, gentle motions can also be programmed. In this first stage of development, MAURER SÖHNE has combined 13 robots to form the MAURER Xtended RoboTower, but other combinations are also possible. The passengers climb a double spiral staircase in the center of the RoboTower and access the twin seats or cabins via three platforms.

### Free choice of theme

The framework of the MAURER Xtended RoboTower is ideally suited for attaching decoration and offers the park operator complete freedom regarding the choice of theme. The first model was built as an "Octomone": a wildly rampant octopus with numerous arms and tentacles shooting up over 35 meters (115 ft) into the air. Depending on the desired character of the ride, the working parts can either be hidden or emphasized. A whole range of thematic concepts have been developed, including the entirely enclosed "Snowman"; a "crystal" consisting of steel, glass and mirrored surfaces; and the "Nemo" in

which the robots are fully integrated into the design. The open steel construction allows special lighting effects. Possibilities here could include a lighthouse illuminated from within or an iceberg.

### Serving different target groups at the same time

It is also possible for the robots to be synchronized or for each robot to run a separate program. This offers amusement parks the unique opportunity to serve different target groups simultaneously with a single ride: from Family to Thrill. The full mobility of the robots offers an entirely new and, above all, completely unpredictable kind of ride experience. Despite its unique mobility, the MAURER Xtended RoboTower meets the most stringent safety requirements. Each individual robot is DIN 4112 certified, complies with the DIN EN 775 and ISO 10218 safety standards and is tested by TÜV Süddeutschland (Technical Inspectorate, Southern Germany). The same applies for the whole ride. □

# Spinning in Korea

## "Zooland" park opens with MAURER Coaster



His Grand Opening celebrated the new park "Zooland" on May 5<sup>th</sup>, the traditional Children's Day in Korea.

May 1st was the dress rehearsal for the opening of a new amusement park – the fourteenth in South Korea – near Taejeon, the third largest city in the country.

### Animals, botany, amusement

The park is embedded in the Boomunsan valley, a beautiful hilly landscape with subtropical forest and fauna. Its owners, the Kyeryong Construction Industrial Co., one of Korea's largest construction companies for residential and industrial buildings, christened the new park "Zooland", thus indicating a family park with animals, botanical gardens and amusement areas.

The fact that the new Zooland park has opened this season, at a time when the Asian recession has not yet been surmounted, and other Korean parks have been unable to keep up their attendance figures, or have even had to close following the boom in Olympics year, 1988, testifies to the courage of the founders and demonstrates the unbroken pioneering spirit of Korean private industry. Indeed, the new park has got off to a flying start. The planners of Zooland, which is located in the middle of the country, between the population centers of Seoul and Pusan, have learned their lessons well and have

designed the character of the park in accordance with the culture and tastes of the Korean people who have a strong sense of family.

At this first stage (others are to follow in 2004 and 2006), the planners have done without installing spectacular, big thrill rides, concentrating instead on laying out the park for family recreation and school outings, thanks to the beautiful surrounding scenery. At present, the park houses a number of carousels, an Intamin freefall tower and a Spinning Coaster.

### Grand Opening on Children's Day

On May 5th, the traditional Children's Day in Japan and Korea, the park celebrated its Grand Opening, with official reports estimating first day attendance of close to 100,000 visitors. The unchallenged favorite was said to be the Spinning Coaster, the same as the ride installed in Korakuen Park, at the Tokyo Dome, Japan, in 1999. This kind of compact, affordable ride, which looks less thrilling to onlookers than it really is, as riders discover to their excitement, seems to strike the right balance between fun and thrills, as testified by its frantic reception from Korean riders of all ages.

### Spinning by centrifugal forces

As with all MAURER SÖHNE Spinning Coasters, the riders are seated in single cars with 4 seats arranged in two rows, back-to-back, facing outward from the pivoting center. Single molded seats with single safety lap bars provide for comfort and safety. Lap bars with hand grips have a triple locking system and are monitored before dispatch. After reaching the top of the chain lift at approx. 40 ft (12 m), spinning is enabled at the first of four U-turns at the top level. Spinning is generated by centrifugal forces alone, thus allowing a chaotic motion of the cars and making every ride a uniquely different experience.

Depending on the spinning as the cars go into the turns, curves and other ride elements, the riders pass through the following drops and camelbacks forwards, backwards or sideways. The low front panel of the cars prevents the passengers from seeing much of the cars or the rails, and it is precisely this feeling of spinning freely in space with no real sense of orientation that gives this ride its real kick. Spinning can be wild, especially if only two seats side-by-side are taken, while it is gentler if all seats are occupied by large male passengers. Spinning clockwise or counterclockwise, the riders arrive safely back at the station brake, where the cars are aligned and locked for exit and loading, after about 70 seconds

and 300 m (984 ft) of track. The capacity of the six four-seater cars is over 600 passengers per hour, but on Children's Day, the crowd standing in line for this ride could easily have taken up twice this capacity. Some of the enthusiastic young fans would have liked to remain seated for a second ride, but this was not permitted on opening day, due to the size of the crowd.

### Spinning in Europe and Japan

MAURER SÖHNE specializes in rides with single spinning cars rather than those with conventional trains. In addition to the Compact Spinning Coaster, operated both here at Zooland and in other parks in Europe and Japan, the Munich-based manufacturer has also built a larger type, the MAURER Xtended SC 2000, and even



In the MAURER Söhne Spinning coasters the riders are seated in two rows back to back, facing outward of the pivoting centre.

larger custom-designed "Xtended" rides. One final remarkable example of this kind of ride is the MAURER Xtended SC 3000 duel spinning coaster in the new "Wuzetown" hall at Phantasialand near Cologne, Germany (see article on page 2). □

# Two Xtended Spinning Coasters for the UK

## Chessington Wild Adventures and Alton Towers Park

The English Tussaud's Group has taken on a lot for the 2004 season, as far as new roller coasters for its UK parks are concerned.

Chessington Wild Adventures in Sussex and Alton Towers in Staffordshire have both ordered custom-designed Xtended Spinning Coasters from MAURER SÖHNE, with components and cars based on the technical design of the "Winja" duel Spinning Coaster installed in 2002 at Phantasialand in Germany (see article on page 2). However, for budgetary reasons, they do not have the same full range of special effects as this outstanding coaster. Both coasters are equipped with the well-known MAURER 4-seater spinning cars, which run at top speeds of 65 km/h and up to 3 g on the backbone-free track, and are designed for a maximum capacity of 950 persons per hour.

The coaster for Chessington Park is somewhat longer than its brother at Alton

Towers, and the track closely hugs the hilly landscape due to the general height restrictions in the region, as do most of the park's other coasters. To reduce overall height, the new coaster has a second chain lift. Shortly after leaving the first lift, at a top height of 18.5 m (61 ft) above ground level, the spinning of the cars is released for a highly dynamic, steep, twisting first drop and the well-



known MAURER "Immelmann" with 90° banking. A straight second drop is followed by plenty of airtime as the cars run through a camelback then a carousel close to the ground. Riders pass through the second lift, after which a slalom triggers spinning again, followed by a series of fast left-right turns before reaching the station brake with its automatic car alignment system.

### Immelmann swings over the restrooms

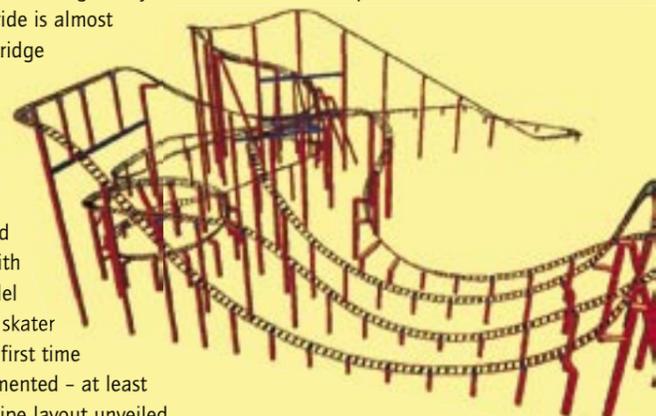
Spinning is locked to make the cars crawl continuously through the station at very low speed for exiting and reloading. Incidentally, the track layout not only has to follow the hilly terrain, but also has to skirt around a number of existing buildings in the park. For example, the Immelmann track swings right over the restrooms!

Photograph of track production MAURER SÖHNE, here using the latest laser measuring technology for track production for the two Spinning Coasters ordered by the Tussaud's Group. In the picture: Ladislav Babik.

### Dueling Immelmann

The coaster for Alton Towers, with a track length of 440 m (1,444 ft) and a lift height of 17 m (56 ft), is slightly shorter, yet at the same time slightly higher than its big brother at Chessington. The maximum targeted capacity of 950 pph is achieved with 8 cars on the track, as opposed to 9 for the Chessington layout.

The location of the ride is almost level, but it has to bridge the central path through the park several times. The unique feature in this layout is the duel: two intertwined Immelmann turns with a total of four parallel track drops like in a skater halfpipe. This is the first time MAURER has implemented – at least partially – the Halfpipe layout unveiled at the Genoa show back in January.



Unique layout: the duel - two intertwining Immelmann turns, with a total of four parallel track drops like in a skater halfpipe.

## Revolutionary freedom on the tracks



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### Change within a few minutes

Car maintenance and repair requirements have been drastically simplified. If a problem occurs, the complete seat unit can be exchanged within a few minutes. Any repair work or necessary adjustments can be carried out easily and conveniently in the maintenance store, without pressure of time and with no detrimental effect on the ride capacity.

One inherent feature of this design is that it provides a basic structure by means of which a wide range of customer requirements can be implemented in an economical manner, e.g. very special seats for disabled people. Furthermore, there is also a stand-alone seat unit that is suitable for a broad spectrum of different applications, not only in connection with roller coasters, but also with other amusement rides as well as in many other diverse safety-related fields.

### Freedom on tracks as a unique experience

The development of the X-Seat with its ergonomically optimized seat offers comfortable seating for nearly all passengers and sufficient legroom. This development represents the longed-for milestone achievement giving complete freedom on tracks. For the first time, we have an absolutely secure seating system enabling us to dispense with shoulder restraints and able to cope with negative g-forces of more than -1 g.

This system enables unique freedom of movement, particularly for the upper part of the body, a completely new sensation during inverted figures. As if this were not enough, the extremely fun airtime passages, i.e. ride elements giving riders the impression of being lifted out of their seats, are no longer felt as pressure from the shoulder restraints, but as a force capable of pulling passengers right out of their seats. For amusement rides, a unique and completely new riding pleasure has become reality.

Until now, the values for airtime forces have been kept to a minimum when designing ride elements. However, these forces can now be increased for maximum fun (within feasible limits) to create completely new ride experiences. Now, it is possible not only to make well-known ride elements including airtime forces, such as the Camelback, more extreme, but also to create unprecedented elements increasing sensations by means of long-lasting

negative g-forces. These could include a series of upside down elements, such as a special loop-the-loop characterized by a very slow and thrilling inversion at the summit of the ride.

### From X-Seat to X-Car

In addition to the seat development MAURER SÖHNE began, at the start of 2002, to focus its attention on how to exploit the excellent X-Seat features effectively in roller coasters. Right from the start, it was obvious that the design of tracks and cars should not be too restrictive with regard to the requirements of riders, parks and developers. The systems to be developed, named X-Car from the outset, were to offer maximum flexibility in every respect.

It was considered most important to let the riders enjoy the new ride experience of the X-Seat in every way possible and with all possible ride elements. The limits for the forces were thus set very high: vertical positive 5 g, vertical negative more than -1 g, lateral 1.8 g, longitudinal 1.5 g. In order to implement even the most daring ideas of new ride elements, the car was expected to be extremely versatile and designed to cope with very tight bends. For this reason, only a single car was deemed suitable, as trains require much space and track length for going through bends.

The train length can be illustrated in the same way. With this single car, inversions with an extremely low vertical radius are possible. In such a ride element, for example, all six riders in the car feel an acceleration of -0.5 g. Assuming a similar ride element is done with a train – as far as technically feasible – the value for the acceleration would vary between approx. +1.5 g and -0.5 g, depending on whether the passenger is seated in the first, middle or last row!

### Weightlessness for all riders

If a single car goes over a Camelback, this ride element can be ideally and simply designed as a ballistic curve. All riders experience the same sensation of weightlessness lasting a long time, e.g. 3 to 5 seconds.

If a train is used with this ride element, vertical acceleration varies by up to -2 g, and – what is much more uncomfortable – with longitudinal acceleration there are differences of  $\pm 1$  g, as opposed to 0 g desired in each case. Consequently, Camelbacks have to be extended and flattened out for trains. As a result, trains have to run such passages at much greater speed. This measure alleviates the problem slightly, but cannot eliminate it entirely. Moreover, higher speeds reduce the fun on this part of the track.



The new X-Car: an extremely versatile single car, able to meet a wide range of requirements.

For reasons of capacity, instead of a 4-seat car, a bigger 6-seat one was designed. This can be extended to a very flexible mini train with the help of a second 6-seat car. This way, one can meet requirements of more than 1,500 pph.

### 2 seats instead of 4

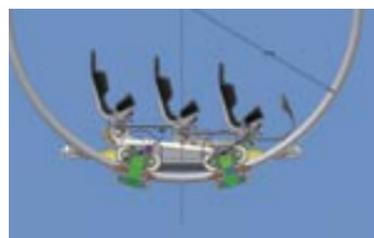
The decision was taken to design the cars with 2 seats per row, rather than 4, partly because of lower restrictions relating to clearance envelopes and partly for another reason: the design values for a sharp turn are 6.7 m/s vehicle speed and 3 m (12") radius, causing a lateral design acceleration of 1.5 g. This means that in a car with 2 seats per row, the passenger feels a lateral acceleration of about 1.35 g in the inner seat and about 1.65 g in the outer seat. In a car with 4 seats per row, the values vary, ranging from about 1.05 to 1.95 g – a difference of about 90%. With other elements, such as rolls, these relations are similar. This example clearly illustrates the problem of car or train width.

These figures and examples give sufficient evidence for the advantages of a single car and explain the restrictions occurring with a long train.

Taking these figures into consideration, a car has been developed, the design of which meets all requirements regarding mobility.

### Extremely tight radius

The X-Car can cope with even the most extreme and unprecedented ride situations, e.g. a valley with an extremely tight radius. The curve is very sharp, so that the track looms up before the riders' eyes, before they climb the steep ascent.



The X-Car can cope with even the most extreme ride situations: a valley with an extremely tight radius.



The extreme mobility can be used with special inversions.

### Special inversions

With other motion coordinates, the X-Car displays similar qualities in terms of mobility. Such mobility can also be used with special inversions.

### Mechanical ride effects

To make the ride more flexible and variable, further effects, so called mechanical ride effects can be added, such as see-saw tracks, tilting tracks, hinge tracks or high-speed vertical lifts, already used by MAURER SÖHNE with spinning coasters. From an economical point of view, these effects can only be realized in conjunction with single cars.

### Stadium seating

Single cars are particularly advantageous, as every rider is seated in the front where the sensation of freedom can be best enjoyed. The seat rows are terraced (so-called stadium seating), with the back row in the highest position. Compared with former car concepts, the car is much more spacious thanks to the legroom created in the X-Car and the space between seats. A maximum of seating comfort and riding fun is assured. As this seating comfort offers more freedom, the sensations felt in each ride element are more intense. Due to the large space between rows, full capacity will be supported, as passenger entry can be handled more rapidly and effectively. Fewer seats are left free because the seats are appreciated as single seats as well, although arranged in pairs.

### Even 6-seat spinning

The flexibility of the X-Car concept, which allows for a multitude of unique layouts and ride experiences, is enhanced by the modular system. Each X-Seat is designed as a unit which enables the construction of all kinds of car types. 6-seat non-spinning versions – also available as a floor-less variant – and even 6-seat spinning versions are being designed, offering the possibility of spinning within a loop-the-loop.

Sharing the same platform, different types of cars can be used within the same layout. A later upgrade of cars is possible. Due to the modular structure of the X-Car concept, future applications, such as interactive elements, can still be integrated.

### Vast thematic potential

Besides the technical requirements of the X-Car, the design of the car was equally important. Sophisticated engineering is supplemented by a high quality appearance of the cars, giving the rider a feeling of security. The flexible design of the car's appearance means that it can be easily adapted to different requirements and themes (see examples).



X-Car as Mine Train



X-Car as Gecko



X-Car as Gokart

The development of the 6-seat, non-spinning X-Cars was completed in the summer of 2003. In September 2003, the first car was unveiled to interested park owners. □



The angle at which the seat is tilted can be adapted to suit the desired theme.



X-Seat enables the construction of all kinds of car types: 6-seat spinning for example.

# Halfpipe!

## Feel like a snowboarder!

At the Euro Amusement Show in Genoa, Italy, January 2003, the innovative MAURER SÖHNE Coaster designers presented one of their latest Xtended Rides: the Halfpipe.

The concept of the "Halfpipe" is based on MAURER SÖHNE's new Xtended Rides, and includes the new developed X-Car, X-Seat, X-Effects and X-Brakes. These are combined with existing ride elements to create a unique, high-quality family roller coaster with a track length of 650 meters (1.970 ft) and an hourly capacity of 1,000 passengers. The height difference of the lift, which needs to be taken into consideration, is 17 m (56 ft). The floor-space requirement is approx. 80 m (262 ft) by 45 m (148 ft). The Halfpipe creates a unique feeling of snowboarding down a deep snow track by means of single cars which perform very dynamic movement through the highly banked turns, side drop, vertical drop and loop. The option of using floorless or non-floorless, spinning or non-spinning cars adds to the attractiveness of this coaster.

The relatively small floor-space requirement and the highly banked curves provide good, very concentrated thematic potential. As with all MAURER SÖHNE rides, the design, the structural calculations and the manufacturing process of this ride all conform to the stringent German safety standard DIN 4112 and have been certified by the TÜV (Technical Inspectorate) Bavaria, in Munich. □



The single X-Car enhances the dynamic movement of the tracks.



Typical of the Halfpipe: the very highly banked turns.



The loop, just one of the highlights alongside others such as the side drop and vertical drop.

### Flip, back scratch and 180°

The new X-Seat allows passengers to enjoy the loop and heart roll without a shoulder restraint system (see article on pages 1 and 4). The main part of the Halfpipe consists of the highly banked curves called flip, back scratch and 180° that are dueling (intertwined) with the second part comprising further highly banked turns. The number of highly banked curves can be chosen according to the customer's requirements.



The Halfpipe creates a unique feeling of snowboarding down a deep snow track.

The result: a genuinely novel sensation unknown to the world until now. The MAURER SÖHNE "Xtended" product range brings you a completely new ride with

- maximum variety thanks to new surprises throughout,
- an unforgettable ride experience thanks to sensational dynamics,
- breathtaking exhilaration throughout the ride, and
- entertainment for the whole family and for all age groups.



X-Car as Snowboard



## Round the bend, but not off the rails

### The Xverter turns everything upside down

**Roller coaster fans are not faint-hearted. However, MAURER SÖHNE has now made it possible to add a new dimension to the ride experience by means of a further world first: the "Xverter" adds an extra kick to spectacular track designs by running them upside-down - without shoulder restraints.**

"Xverter" is not a roller coaster with suspended cars; passengers should take "inverted" more literally. Many figures are actually performed upside-down. A few examples:

- The "Humpty Bump Lift" ascends vertically, offers a brief inverted ride at the top and then plummets vertically back down again.
- The "Inverted Camelback" uniquely offers inverted airtime.
- In the "Negative G Loop", an additional turn at the highest point of the loop transforms the positive G forces to negative G forces: instead of being pressed down into their seats, the passengers feel the forces threatening to pluck them out.
- The "Reversed Cuban-8", a half loop followed by a half roll familiar from the world of aerobatics, takes the form

of a parabolic trajectory in the Xverter approach and is executed - including airtime - in the inverted position. A vertical drop brings the passengers back to a normal position - only briefly, of course.

The Xverter is a perfect addition to the MAURER Xtended family. Xtended simply offers more: more thrills, more excited visitors, more possibilities. The modularity of the X-Cars combined with the highly flexible track designs, for example in the Xverter, open up exciting new track configurations for a wide range of target groups. □



The "Humpty Bump Lift"



The "Inverted Camelback"



The "Reversed Cuban-8"

## You've gotta be skidding!

### Unbelievable feeling: Drifting X-Car

The creative development team at MAURER SÖHNE is clearly bursting with ideas. A further world first is the "Drifting X-Car": in curves, it gives roller coaster passengers the horrifying feeling that their car is coming off the tracks.

The new Drifting X-Car is based on the MAURER X-Car. The X-Car (see article on pages 1 and 4), with four or six seats, is much more maneuverable than a train. It provides the passengers with a direct track experience without delays or restricted visibility and allows a much narrower, more versatile track design. The X-Car comes in floorless, spinning and now "drifting" variants.

#### Pivot point at the front of the car

This new effect, the first of its kind anywhere in the world, allows the cars to

leave the tracks when cornering. The pivot point is situated at the front of the car and the effect sets in so suddenly that the passengers really do feel that the car is skidding out of control. The trigger point for this effect can be set as required, i.e. "drifting" can be induced by even relatively harmless curves, or just as an additional kick in tight curves with high centrifugal forces.

#### Rallies and motor races

The innovative Drifting X-Car lends itself particularly well to themes such as rally racing, Formula 1 or go-cart races. The track should be designed with as many curves as possible in order to generate centrifugal forces triggering the drifting effect.

For the passengers, the drifting experience simply cannot be compared with a normal roller coaster ride. Anyone sitting



In curves, the "Drifting X-Car" gives roller coaster passengers the horrifying feeling that their car is coming off the tracks.

in a floorless Drifting X-Car on a track set up in "dueling layout" (two intertwined tracks) can expect a rush of pure adrenaline, lots of fun and countless surprises - all without shoulder restraints!

The Drifting X-Car can be used on all MAURER Xtended Roller Coasters. This means that park operators can simply upgrade existing rides by replacing some or all of the cars with the exciting new Drifting X-Car. □

# First the view, then the ride experience

## Coaster + Tower = MAURER Xtended Coaster Tower

Within just a few months of launching one world first onto the market, MAURER SÖHNE did it again. Hot on the heels of the Halfpipe Coaster (see article on page 5) came the MAURER Xtended Coaster Tower. This innovative ride combines the concept of a roller coaster with that of a tower, with access to the coaster near the highest point in the tower. This top-class attraction knows how to draw a crowd: it looks interesting from a distance and exciting close up; the passengers get to take in the view from the top before they even climb onto the ride and then enjoy an intensive roller coaster experience on the way back down. The MAURER Xtended Coaster Tower offers all the attractions of a large roller coaster in a relatively small area and requires only moderate investment. The modular structure maximizes the thematic potential of the ride.

### Low cost – high attraction

For reasons of space or cost, many amusement parks balk at the idea of investing in a large roller coaster. However, it is getting harder to attract many visitors with small family coasters. The new MAURER Xtended Coaster Tower bridges this gap. It combines a short, but particularly high-light-filled track with a tower. The actual access to the ride is situated near the highest point on the track.

tight curves and provide maximum camel-back airtime for every seat. The X-Seat has no shoulder restraints. This means that the passengers are free to move the upper parts of their bodies even during inverted figures – freedom with a rush of adrenaline.

### Station in high-up position

This intensive track design packed with highlights is only possible because the high-up position of the station dispenses with long and tedious ascents and deceleration stretches. Furthermore, the attractive circuit itself catches the attention of onlookers. It is custom-designed to meet the requirements of the operator, with a double loop-the-loop, for example, or half-pipe effect. This throws down the gauntlet to visitors to the park, who feel they have to prove something to themselves and to others and try it out.

### Double and even treble thrills

The compact design of the MAURER Xtended Coaster Tower has an added advantage: at times when the ride is less busy, it can be run through twice or even three times. If this “happens” unannounced, some passengers will catch their breath as they race through the station without stopping.



The Xtended MAURER CoasterTower combines the concept of a roller coaster with that of a tower, with access to the coaster near the highest point in the tower. This provides all the attractions of a large roller coaster in a relatively small area.

### Eye-catcher with great thematic potential

The Coaster Tower concept has a whole range of advantages. The tower catches the attention of visitors a long way off and the design can be freely adapted according to the theme of the park. From a purely functional point of view, it serves simply to get the passengers up to the roller coaster, but it is an experience in its own right. Even at busy times, the wait is not boring for the passengers who can enjoy the view. This is the calm before the storm. The track may not be particularly long, but it has what it takes. You won't find any slow ascents or lulls in this ride. Highlight follows highlight and the ride sensation is further heightened by the MAURER X-Car with its X-Seats. The short six-seater X-Cars can take particularly

At peak times, a parallel station allows passengers to get into another car and start the ride without having to wait for the returning passengers to disembark.

The possibilities afforded by the tower in the MAURER Xtended Coaster Tower are not yet exhausted. It can also serve as the starting point for other attractions, such as a giant slide, a MAURER Xtended RoboTower at a dizzying height, or a second Coaster. The advantage for the investor: the second attraction can be integrated one or two years later. This eases the financial burden and leaves time for a marketing campaign with the second attraction.

One final idea: how about extending the tower above the station and fitting it with a viewing platform – something for visitors of all ages. □



There is one thing nobody expects: an earthquake. Just imagine: you are riding upwards, enjoying the scenery, when suddenly a tremor goes through the tower, it starts to shake, and you find yourself plummeting towards the ground.

# Earthquake in vertical ride

## MAURER Xtended Power Tower with world first

### “The tower is shaking!”

MAURER SÖHNE offers, as a world first, a scenario which would be met with horror in a genuine emergency: the MAURER Xtended Power Tower Earthquake shakes. Combined with the already unrivalled variety of ride variations and seat tilting, the result is a vertical ride packed with potential for incorporating the ride experience into an exciting story.

### More than just a tower

Towers are recognized as attractive eye-catchers in any leisure park, but their thematic integration into the park is difficult due to the general lack of variation in the up-and-down motion. With the Xtended Power Tower concept, MAURER SÖHNE already set things in motion. The manufacturer consciously avoids the term “free-fall tower” and offers the tower as a “vertical ride”. While the tower indeed possesses all the capabilities of a free-fall tower, the fact that the gondola is under full control at all times and can be maneuvered opens up a whole new world of ride figures.

### The lights go out

The new Earthquake variant manages to top even this wealth of variety. Whatever hardened passengers expect from a ride, one thing they do not expect is an earthquake. Just imagine: you are riding upwards, enjoying the scenery with a mixture of joy and excitement ... when suddenly a tremor goes through the tower, it starts to shake, the seats begin to tilt and the next second you find yourself plummeting towards the ground. “It’s sheer horror”, says Beutler, Managing Director of MAURER SÖHNE, “and it significantly increases the variability of the Xtended Power Tower.” The effect can be enhanced by means of audiovisual stimuli: a dull rumble, thunder and lightning, or – for particular effect at night – the lights go out.

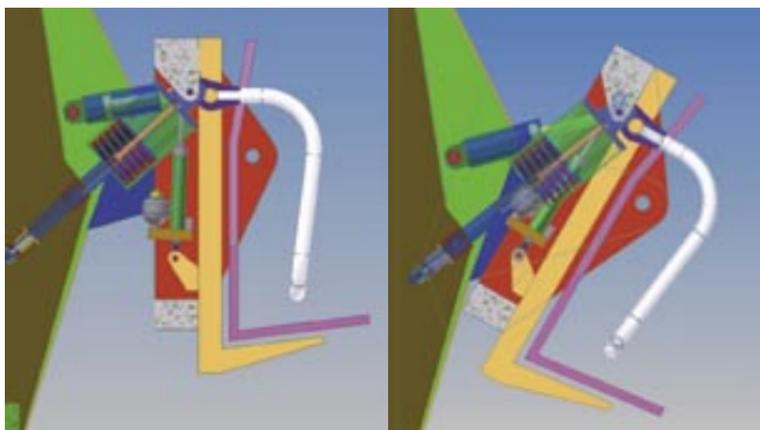


The Xtended MAURER Power Tower in Sevilla

### Xtended philosophy

The Earthquake would not be a worthy member of the Power Tower family if it did not also subscribe to the MAURER Xtended philosophy. Xtended simply offers more – and in the case of the Earthquake, this can sometimes mean less. Not every passenger wants horror. This is why Xtended Power Tower rides always come with a range of different programs; the standard number is six, ranging from Fun and Family to Thrill. All effects can be toned down; fun rides and quaking horror trips are aimed at completely different target groups. The operator can vary the ride according to the time of day and type of passenger, or program customized ride profiles.

As with all MAURER Xtended Power Towers, not only the ride programs, but also the visual effect can be freely designed, from the tip of the tower to the different types of gondola. All these aspects team up with the highest hourly passenger capacity of any vertical ride. With a start time of 85 seconds, the “Up and down” program can accommodate 1,350 passengers per hour. □



The tilting seat gives passenger the feeling their seat is being pulled out from under them.

For example, the MAURER Xtended Power Tower can cause the passengers to experience a staggered fall and sudden drops during the ascent, it can start and stop the descent at any desired height, and can also tilt the seats forwards by a unique 30 degrees.

It goes without saying that safety is absolutely guaranteed: The MAURER Xtended Power Tower Earthquake is built in accordance with the stringent German DIN norms and tested by TÜV Süddeutschland (Technical Inspectorate, Southern Germany).

# Effects controlled using water pistols

## MAURER SÖHNE develops world's first Interactive Water Rides

The innovative ride producer MAURER SÖHNE has come up with yet another world first: Interactive Water Rides boost the fun to be had from a boat trip through a varied waterscape by introducing an additional element: the challenge of completing a certain program with the aid of water pistols. A further innovation lies in the details: a submerged waterway allows easy installation even in existing stretches of water. MAURER has applied for patents on its Interactive Water Rides.

### Armed with Water Pistols

Water rides have always fascinated visitors of all ages, but expectations are steadily increasing. MAURER SÖHNE addresses these demands with the newly-developed "Interactive Water Rides". The clincher is to arm the passengers with water pistols, and to seat them in round boats facing outwards. The water pistols can come in any shape or size, from squeaky plastic animals with a spray nozzle to water pistols fitted with reservoirs of various sizes, or even watering cans or hoses. These are used to aim at objects in the landscape as the boats float past. This gives the passengers the sense of being on a quest and greatly increases the fun factor.



Model of a new boat type: round, with the passengers seated facing outwards.

### Direct hit for a waterfall

When it comes to design details, the imagination is given free rein. The simplest concept is to set up targets along the course. A bull's eye triggers various effects, such as a plume of water or a crashing waterfall, an earthquake that rocks the boat, or a sudden torrent that accelerates the ride. Another possibility would be for the boat's passengers to score points according to the number of hits. This would encourage teamwork within the boat and could be rewarded, for example, with a repeat ride, a meal voucher or some kind of gift connected with the theme of the ride.

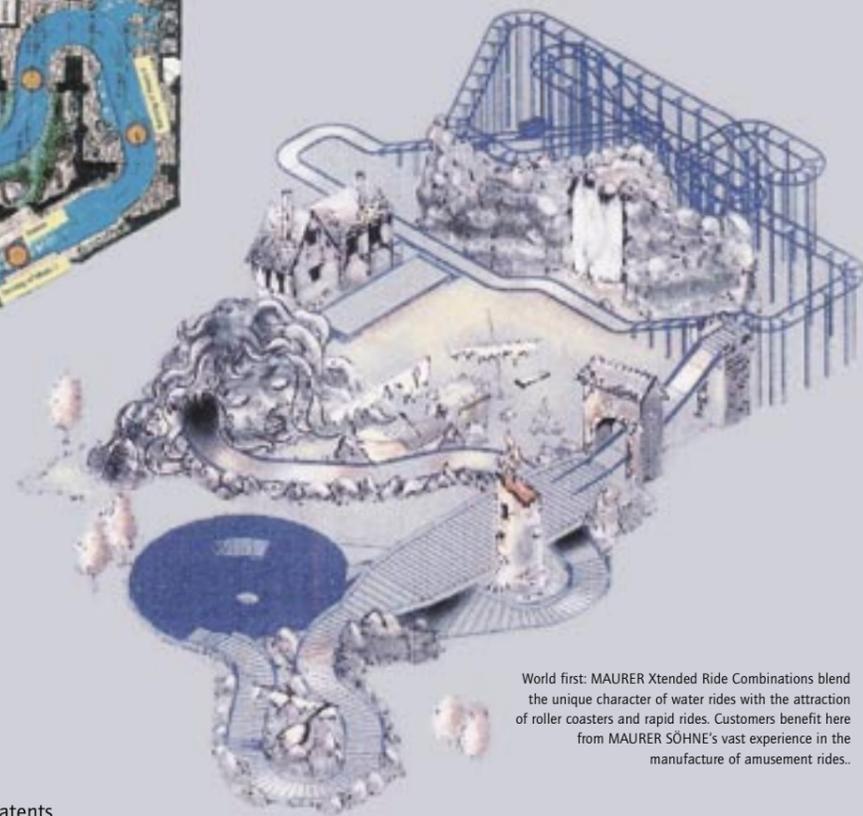
The vast thematic potential of the Interactive Water Rides is a major advantage: the passengers can search for treasure in enchanted caves, take part in a feverish hunt for pirates on the Mississippi, or enjoy a pleasant ride through fairyland. The design of the boats, effects and surrounding landscape offers scope for a wide range of illusions.

### Continuous, slow rotation

The Interactive Water Ride from MAURER SÖHNE can also be used with vessels of other shapes, but round boats, designed as standard to accommodate 8 passengers, lend themselves more readily to surprise effects. The continuous, slow rotation of the boats makes orientation and aiming more difficult, while unexpected currents from different directions catch the passengers unawares. There is no rest until you have safely docked once again. The mooring is designed with safety in mind. A moving walkway means that climbing in and out is easy, even for small children and older or disabled passengers.



In close cooperation with the customer, MAURER SÖHNE develops water rides that make optimal use of the existing terrain.



World first: MAURER Xtended Ride Combinations blend the unique character of water rides with the attraction of roller coasters and rapid rides. Customers benefit here from MAURER SÖHNE's vast experience in the manufacture of amusement rides.

### Concealed waterway

MAURER SÖHNE has applied for patents for the newly-developed Interactive Water Rides, covering the entire system. This includes the innovative waterway system for use on lakes: the passengers are conveyed from island to island and from shore to shore as if guided by some magic hand. The secret is in the concealed, submerged canal elements and precisely calculated currents that steer the boats.

"Interactive Ride" is but the latest MAURER development in the field of water rides. The Munich-based manufacturer also offers a complete spectrum:

- Slow Boat Rides
- Splash Rides
- Flume Rides
- Rapid Rides

On top of all this, MAURER SÖHNE uniquely combines water rides with roller coasters to form the Water Coaster.



All water rides can be enhanced with additional effects that render them



Fun for every target group with MAURER water rides

unmistakable, such as a vertical lift, big wheel, free-fall, waterfall or whirlpool. □



## Life-Cycle Management

"After Sales Service" is the general name for the service given to the customer after the sale of a product, but MAURER SÖHNE prefers the term "Life-Cycle Management" – and with good reason. MAURER SÖHNE is conscious of its responsibility towards the customer throughout the entire service life of the product and regards service as an on-going commitment.

This starts at the time of purchase, with services such as technical inspections (carried out by TÜV), acceptance tests, staff training and documentation. MAURER SÖHNE's support for customers during operation includes, for example, a large

spare-parts warehouse, fast spare-parts delivery, and a consultancy service for optimization, repairs, and materials testing. However, MAURER Life-Cycle Management also means extensive quality management, customer communication management, product follow-up management and modernization of the ride or support with the sale of the ride when it is no longer required. Our dynamic staff are there to ensure that this concept is brought to life. In the picture (from left to right): Franz Friedl, Olaf Schmitz and Guido Bäuerle (Head of Department). □

## Detailed technical information for roller coaster operators

While visitors are attracted by prospect of fun, park managers are interested in the attraction itself – but at the end of the day, a roller coaster essentially consists of technology, measurements, calculations and data. For this reason, MAURER SÖHNE regularly publishes product information sheets for industry insiders. These information sheets focus on technical information. Two product information sheets are currently available from MAURER SÖHNE:

- Non-automatic and automatic brakes in roller coasters
- Passenger-carrying capacities of roller coasters with single cars

Both Ger. and Engl. versions are available.

### Non-automatic and automatic brakes in roller coasters

This six-page A4 information sheet deals firstly with the different types of brakes and their respective tasks and then gives a description of different designs and their efficiency. The technical information is illustrated with photographs and diagrams.

### Passenger-carrying capacities of roller coasters with single cars

This information sheet, also six pages in length, starts off by outlining the advantages of single cars and then provides detailed capacity calculations. The relationship between block time and capacity

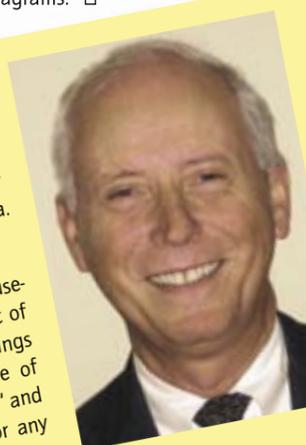
is explained in detail, as are station organization and the associated loading/unloading times and the influence of vehicle size on the capacity of the ride. The topic is illustrated with photographs and diagrams. □

## Focke for MAURER

MAURER SÖHNE, the innovative manufacturer of roller coasters, vertical and water rides, is pleased to announce the partnership with David Focke of APS, Worldwide for the sales and marketing of its rides in North America.

### 25 years' experience

Focke has over 25 years of experience in the amusement park industry, most recently as Vice President of Construction and Maintenance at Paramount's Kings Island. For information on the new Xtended line of coasters with unique layouts, such as the "Halfpipe" and "Clock Tower" (see articles on pages 5 and 6), or any MAURER SÖHNE product, call Dave at 513-583-8110 or e-mail at [aps@cinci.rr.com](mailto:aps@cinci.rr.com).



## Head over heels into a new era



Highlight at the 2nd Munich Roller Coaster Forum: six MAURER SÖHNE employees convincingly demonstrate the safety and comfort of the revolutionary new X-Seat – inverted, without shoulder restraints, and in the best of spirits. In the picture (center): Managing Director Jörg Beutler

The 2nd Munich Roller Coaster Forum at MAURER SÖHNE (Munich) and Phantasialand (Cologne) on 26 and 27 September had an action-packed program. The program was so full, and the impressions the two days left on the 40 visitors from around the world so varied, that it is difficult to single out a particular event.

Even the most grudging skeptic had to admit that MAURER SÖHNE had succeeded, as the first manufacturer in the world, in developing a seat – and associated car – that allows inverted figures and negative g figures without the need for shoulder restraints. Furthermore, the new X-Seat is also more comfortable than previous roller coaster seats and the new X-Car is more versatile and flexible than its predecessors (details can be found in the articles on pages 1 and 4).

Also available for the participants to try out – with five ride programs ranging from “light” to “heavy” – was an original Robocoaster.



Exciting unveiling of the MAURER SÖHNE innovations X-Seat and X-Car.

### Turning management upside down

The award for the most spectacular highlight – and high it certainly was – must undoubtedly go, however, to the presentation of the revolutionary new X-Seat and X-Car at high noon on Friday. Six employees, including Jörg Beutler, Managing Director in charge of Amusement Rides, sat in the X-Car, which was then turned upside down and suspended from a crane. The forum participants then also had the opportunity to be inverted in the new seats and experience the new ride sensation.

### Bundled specialist expertise

Apart from this spectacular highlight, the main priority for the professional visitors was to keep abreast of the state of the art and current developments in the amusement sector.

**Jörg Beutler**, Managing Director, MAURER SÖHNE, gave a brief presentation of the company and its current innovations.

**Horst Ruhe**, President Sales, illustrated the MAURER Xtended philosophy and gave an overview of the Xtended product range.



Factory tour (from left to right): Andrew Mellor (Interpark), Rachel Pawley (Drayton Manor Park), Horst Ruhe (Maurer Söhne)



During the factory tour, Werner Stengel also checked the quality of the track production.



John Wardley (Tussaud's Group, left) and Nicholas Farmer (Farmer Studios) going through their impressive presentations.



Curious and skeptical at the same time, visitors to the MAURER Roller Coaster Forum plucked up the courage to try out the shoulder-restraint-free X-Seat.



Interested audience (from right to left): Dr. Ulrich Müller-Oltay, Managing Director of the VDFU (Verband deutscher Freizeitparks und Freizeitparkunternehmen e.V. = German Amusement Park Association), Dr. Petra Löwenthal (Allgäu Skyline Park), and Bernd Speck, Maurer representative in France.

**Robert Gettert**, X-Car design engineer, provided facts and figures about the X-Car and impressively demonstrated the differences between single cars and trains.

**Werner Stengel**, amusement ride project layout and design engineer for over 40 years, spoke on “What’s a Family Ride?”.



At the buffet: Jacky Schoepen (Bobbejaanland)



The test setup demonstrated two things: the tight radii mastered by the new MAURER X-Car and the fact that the new MAURER X-Seat can tackle even inverted ride figures without the need for shoulder restraints. John Wardley showing an interest in the design details.

**Dr. Alfred Müller**, Head of Design and Development, illustrated the innovative potential offered by the X-Car Coaster with the aid of a variety of example layouts (Dueling, Half-pipe, Aerobic, Xverter, Coaster Tower).

**Arno Feldenz** provided an overview of the MAURER Water Rides, with particular emphasis on the new Interactive Water Rides.

**Nicholas J. Farmer**, founder and Managing Director of Farmer Studios Ltd, Vice President of the Themed Entertainment Association, and committee member of BALPA and TILE 2003, picked up on Wardley’s topics and expanded on the practical aspects.

### Mixing business with pleasure: Oktoberfest

The evening saw a plenary session at the Oktoberfest. The visitors were torn between simply enjoying this world-famous beer festival on the one hand, and analyzing the rides with the knowing look of an industry insider on the other. One of the rides under scrutiny was the MAURER Xtended Power Tower, making its Oktoberfest debut this year and, at 63 m, securing its place in the Guinness Book of Records as the world’s highest transportable free-fall tower.



Munich mayor Christian Ude (2nd from left) was among those taking the opportunity to try out the Power Tower.



MAURER Xtended Robocoaster being put through its paces. Its strengths: freely maneuverable in all directions, unpredictable ride trajectory for the passengers, and programs ranging from Fun to Thrill all on one amusement ride.



MAURER Xtended Power Tower at the Oktoberfest: at 63 m, the Guinness record-holder as the world’s highest transportable free-fall tower. In the foreground: the Maurer Wild Mouse.

### Wuze Town and River Quest

On the morning of the second day, most of the Roller Coaster Forum visitors set out for Cologne to visit Phantasialand. There was much animated discussion over lunch, for example with Gary Slade, editor and publisher of AMUSEMENT TODAY newspaper and self-confessed roller coaster fan. The ensuing visit afforded exciting glimpses behind the scenes of the Wuze Town coaster and the River Quest water ride. Many of the visitors seized the opportunity to try out both attractions for themselves. □

## Response

For more detailed information, please select one or more of the following options:

- MAURER Spinning Coaster
- MAURER Xtended Roller Coaster
- MAURER Xtended Coaster Tower
- MAURER Halfpipe Coaster
- MAURER Xverter
- MAURER Xtended Power Tower
- MAURER Xtended Robo Tower
- MAURER Xtended Water Rides
- other \_\_\_\_\_
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 Innovations in steel



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