

## **COMMON SENSE AND SAFETY IN GO-KART TRACK DESIGN AND OPERATIONS IN 2026 EQUALS PROFIT**

**By Peter F. Olesen, P.E.**

Go-Kart track and go-kart design have come a long way since the early days of loose tires and timber barricade and karts with no cushioned bumpers or seat belts. Among the greatest design elements contributing to guest and staff safety on modern go-kart tracks are the continuous steel safety rail, automobile tires and the continuous concrete barrier backing. These elements when combined together have provided an energy absorption system that is unsurpassed in the ability to absorb heavy impacts by collapsing gradually as the energy of the kart is transmitted to the barrier reducing the "G" forces on the driver and kart.

Current Go-karts offer greater driver safety. Modern concession o-karts are designed with automobile style or four-point seat belts, improved steering systems, disc brakes, leak resistant fuel tanks, safety shields over flywheels, axles and drive belts and have offset wrap around bumpers. Most gasoline powered go-karts are equipped with engine rev-limiters adjusted by mechanics and wireless speed reducers (Kartrol, etc.) that are controlled by track superintendent. Electric karts are controlled by the track superintendent.

### **Modern Track Geometry:**

As the concession go-karting public grows to expect more in terms of entertainment and excitement, successful designers have moved beyond simple, boring track designs to creating driving experiences that maintain interest in the experience itself. Creative use of varying geometrics, banked turns and grade changes can result in guests wanting to repeat rides, increase number of annual visits and extending the times of stay per visit. Each of these contributes to increased revenues not only for the tracks but for the other attractions and amenities at any given facility.

Reduction of straight track lengths and introduction of more challenging turning movements not only increases the entertainment value of the driving experience, it also reduces or eliminates bored drivers from resorting to the demolition derby or bumper tag actions commonly experienced 15 years ago, and still tolerated on some tracks even today. By creating more challenging driving conditions, in terms of turns and grade changes, go-kart safety has improved greatly. An added feature of all our track designs (other than high banked ovals) has been the incorporation of reversible track operations. Track geometrics are so created as to providing a different driving experience when the karts are placed in the pits facing in the opposite direction. Doing this allows you to create a different experience on different days without your guests having to travel to other facilities to gain different ride experiences. Some facilities change direction daily, others monthly or annually, while others never change direction. Select the approach that seems to best work for your specific facility.

Failure of track designers to avail themselves of modern design tools and concepts can result in tracks being less safe and more boring.

### **Modern Track Safety Barriers:**

Kart/barrier rail contact can be traumatic if the barrier system is not properly designed. Go-kart bumper systems have limited impact cushioning because of the limited compression space of modern kart bumpers. For this reason track designers have sought to reduce the impact by providing additional impact attenuation (impact reduction) through barrier systems that provided additional compression. Over the

years, many track safety barrier designs have come and gone. Most because they did not provide the level of safety expected and others because of extremely high costs.

This writer, a licensed professional engineer, maximizes the compressibility of the track barrier system by using full size automobile tires with diameters of approximately 30 inches mounted flat on the pavement surface, connected to a vertical steel barrier plate adjacent to the track and connected at the back to a continuous concrete curb. This, in his professional opinion, is by far the safest barrier system on the market today. This system provides energy attenuation (impact reduction) through a right angle distance of more than 26 inches horizontal compression. None of the other barrier systems come even close to the impact reduction provided by the barrier curb/automobile tire/steel plate safety rail combination.

Another benefit of the above barrier system is the fact that when the designer develops gutter profiles for the two edges of the track with three dimension coordinates, it allows the construction surveyor to establish a wire profile that can be followed by a slip-form barrier curb and gutter machine that extrudes the curb and gutter along each edge of the pavement path. Once the curb and gutter units have cured, the paving crew uses the two gutter surfaces as the forms for pouring the pavement. This operation eliminates the need for pavement forms.

The use of modern non-reinforced concrete pavement design removes the need for steel reinforcing in the pavement. A qualified designer can provide a pavement mix design compatible with individual state pavement concrete mixes available at local ready-mix plants that, when coupled with proper contraction joint design eliminates the requirement for steel reinforcing in the pavement slab. Entertainment Concepts, Inc. has designed many plain concrete track pavements around the country (and continues to do so) with no reinforcing steel and no shrinkage generated pavement cracks occurring during current life spans exceeding 15 to 34 years and growing.

#### **Safe Pit Design:**

Many successful long time track operators can be found on both sides of the discussion as to whether the use of pit lanes and islands is safer than just painting control lines in the pavement surface. This writer definitely prefers the use of lanes and islands to maintain closer control of moving karts and to reduce the potential of guest or staff being struck by moving karts.

For facilities that carefully train their pit staff and follow up with periodic reinforcement training the difference in safety may be small. Less attentive training and job performance can result in a definitely less safe environment when islands are not used.

The use of free spinning automobile tires and rims mounted on vertical axles installed in the pavement immediately in front of each individual pit island can redirect approaching karts to the adjacent pit lanes rather than their coming in contact with the end of the island.

Providing pit entrance and exit gates is another safety improvement that prevents drivers from pulling off the track and into the pits when the staff isn't ready for them. Designing these gates with a cross section matching the track barrier system is a major improvement in the safety of these gates.

#### **Pit Shade Structures:**

Pit shade structures were originally used to keep the go-karts in the shade when not on the track for guest comfort. As such they also directed the rain away from the karts. Other than our first couple pit shade

structures, designed in the early 90s, all of Entertainment Concepts Inc. pit shade structures were and are designed with roll-up doors all around. This permitted the owners to have secure overnight storage during operating seasons and eliminated the need for a separate kart storage building for non-operating periods. Not every operator chooses to utilize the roll-up door concept for individual reasons.

### **Go-kart track lighting:**

Proper illumination of the entire track surface is necessary to maintain maximum safety, and when the track is visible from the adjacent roadways provides an exceptional “billboard” to attract impulse visits. We recommend an average lighting level on the track surface of 20 foot candles, with a minimum of 10 foot candles.

Modern lighting technology in the form of LED lighting has introduced very low power demand, exceptionally long life and reduced maintenance requirements. We recommend 30 foot mounting heights where permitted, but mounting heights in many communities are fixed by ordinance. The higher the fixtures the less potential glare for the drivers. We recommend sharp cut-off luminaires where ordinances have severe light spillage requirements.

### **Controlling driver behavior:**

History has shown time and again that tracks that routinely allow unruly driver behavior will experience a loss of a major portion of its family unit business as well as adult drivers. Unfortunately there are a number of drivers that seem to think that their purchase of a ride in a go-kart entitles them to act in whatever manner they choose, including demolition derby antics bumping other karts and damaging the physical elements of the track itself. This unacceptable behavior endangers other guests on the track as well as staff members. It also can result in damage to the karts and elements of the track. Beyond the potential carnage on the track looms the potential for litigation by individuals impacted by this behavior.

The cost to the track owners extends far beyond lost revenue, damage to the karts and track barriers and the impact on the other riders on the track. Failure to immediately address the issue, removing offenders and introducing controls to eliminate or greatly minimize this behavior will result in the loss of future ridership not only by the other guests involved, but by word of mouth, face book and other social media venues, which can have massive impacts on future attendance.

Modern karts can be controlled by the track supervisor through the use of hand held wireless controllers that allow the supervisor to shut down the speed of the karts on the track.

The supervisor can put all of the karts on the track to idle speed and make an announcement on a bullhorn that “we apologize for stopping the karts, but the driver in kart 13 is driving in a manner dangerous to the rest of you on the track as well as our staff. We are giving this one warning, if he (she) continues to drive in this manner he (she) will be removed from the track and asked not to return!” By doing this you can turn the irritation of the others against the “villain” while at the same time scoring positive reactions among the rest of the drivers.

### **Common Sense Planning and Operation:**

Taking the time to properly create a more entertaining and exciting experience in terms of more curves, varied curve banking and creating some grade changes, may result in a slight increase in initial construction costs. This must be weighed against sizable increases in ride through-put, resulting increases in repeat visits and annual revenues. Sound design and operation will result in a sizable reduction in incidents on

the track that result in reduced thru-put and increased insurance claims. Overall, the slight increase in initial cost is minimal when compared to the overall entertainment and excitement that result in ongoing increases in ridership and revenues.

Proper planning can create a site plan that will permit adding attractions and amenities in the future without having to shut down current attractions.

#### **Emergency Equipment and Fire Extinguishers:**

No matter how safe the design or the go-karts, there always exists a potential for an accident or fire that requires quick action. Fire Extinguishers should be mounted on poles around the track as required by the local Fire Marshal. Each track should be equipped with a **Safety Box** containing a fire blanket, web cutter for seat belts, bolt cutter, heavy duty gloves, flash light, first aid kit, digital camera, ball point pens and blank accident forms. Each facility will have specific areas of concern that may require specific or unique safety equipment. It is very important to review your specific situation and your planned safety provisions with your insurance carrier.

#### **Emergency Response Plan:**

Hopefully your facility and its operation is based on safety first. Regardless of how safe you seek to be, there is, unfortunately always the possibility of an unanticipated event, be it a fight, accident, fire, storm or other situation requiring immediate and positive action. Develop an **Emergency Response Plan** that establishes procedures for responding to any potential emergency, medical, security, fire, weather, etc. and make certain your staff is trained to respond. This must become a part of a periodic staff reinforcement program and schedule.

Establish a relationship with local first responders, show them your emergency plan and seek their input. Bring them to your facility to make them familiar with its layout and seek their comments.

For new or existing facilities, have a special "First Responders Recognition Event" at your facility, inviting all area fire fighters, police, paramedics, etc. to a special day at your facility. Create special activities and competitions. This has a double benefit, first being to make these important people aware of your facility and its configuration and the second being that many will become future guests because of the exposure. Putting the event out to the media is another wise step to take. Holding similar early soft opening events for teachers, corporate planners, travel agents and local media reporters can also generate additional interest in your facility.

#### **Some closing comments:**

Take the time to know what you are doing. Vendors have a primary mission – selling their product. Far too often glowing descriptions turn into faded reality. Think more than twice before becoming a "beta tester" for a new attraction or concept. Check out other facilities and operators. "Checking behind the curtain" is one form of "thinking outside the box."

Don't be afraid to "think outside the Box." There may be other concepts, business models or attractions that can expand your horizons. Just make certain you maintain a sense of reality in terms of costs versus benefit. Too often "cool and unique" turn into "fool and up the creek."

Be careful and be confident. **May your dreams have rainbows and the pots at the end have rewards, not empty promises.** Be good and you won't need luck.

*Peter is a Licensed Professional Engineer in the States of Illinois, Michigan and North Carolina and is President of Entertainment Concepts, Inc. (formerly Peter F. Olesen and Associates, Inc.). He founded the firm in 1984 and expanded its range of consulting services over the years to now provide a wide range of consulting services. Services range from preliminary site evaluations, feasibility studies, business plan assistance, concept development, master planning, design and construction engineering services that apply to new facilities as well as renovation or expansion of existing facilities. Projects include the design of both outdoor and indoor, family entertainment centers, amusement parks, theme parks, stand-alone go-kart tracks and miniature golf courses, bumper boat ponds and related attractions. The firm has been and continues to be at the forefront of go-kart, miniature golf course and bumper boat pond design, introducing many innovations in safety, geometrics, design and construction methods now widely emulated throughout the industry.*

*To date the firm has completed more than 700 projects spanning 46 states, Angola, Brunei, Canada (Alberta, British Columbia, Ontario, Quebec and Saskatchewan), Cuba (Guantanamo Bay), Kazakhstan, Mexico, Puerto Rico, Saudi Arabia and Vietnam. Since 1987 Mr. Olesen has exhibited at more than 100 industry trade shows. He participated as a member of the faculty of Foundations Entertainment University (49 seminar presentations over 17 years), presented more than 100 seminar presentations at the International Association of Amusement Parks and Attractions, FunExpo, Kart Expo and Leisure Expo, as well presenting go-kart safety seminars for the State of Ohio. He has, and continues to author articles for industry magazines and internet newsletters. For additional information on projects and services offered please refer to our web page [www.fecdesigners.com](http://www.fecdesigners.com) or contact us at 847-561-7013 or [www.peteolesen@yahoo.com](mailto:www.peteolesen@yahoo.com).*

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