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Anti-Diving Safety Systems for Swimming Pools

By Robert Kaplan* and Ralph L. Barnett**

HISTORY

Below the age of four, only the automobile kills more children than drowning. It remains the fourth greatest cause of unintentional death until age 55 [Ref. 1]. Approximately 700 spinal cord diving injuries occur every year [Ref. 2]. To sustain this lofty record the aquatics industry has created a "research-free zone" which it maintains through political, legal and public relations actions. For example, in Michigan, a statute denies an injured diver product liability relief if the pool manufacturer displays a "no dive/no jump" warning admonition. The opinions and statistics presented by a leading researcher in the area of diving safety are systematically and vigorously attacked on the basis that he serves as a plaintiff's expert witness. Full-scale public relations onslaughts have maintained the status quo by opposing government intervention into the development of standards and codes.

With respect to above-ground swimming pools, anti-diving design concepts were introduced in 1982 at the Swimming Pool Litigation Conference in Detroit, Michigan in the paper "Anti-Diving Systems and Shock Attenuating Design of Swimming Pools" and again in 2002 at the World Congress on Drowning in Amsterdam, The Netherlands, in the paper "Aquatic Supervision Versus Design." Further, in 2003 a prototype safety system was presented by Barnett and Poczynok [Ref. 3] in a paper published by the American Society of Mechanical Engineers that provided a proof-of-concept using well-known non-proprietary safety devices borrowed from non-aquatic disciplines. The prototype eliminated every classic danger including those associated with diving, jumping, deck-side horseplay, and unauthorized access. The paper elicited three negative commentaries, each from a defense attorney aligned with the aquatics industry. None of their discussions addressed the design concepts addressed in the paper; instead, they focused on the ugly appearance of the prototype.

DESIGN CONCEPTS

Starting with a clean sheet of paper, the senior author has created two attractive gazebo designs that reflect and extend the safety features described in [Ref. 3]; they are shown in Figures 1 and 2 with conventional pool decking. The dome design is illustrated in more detail in Figure 3 where the meshing is enlarged for clarity. The actual meshing is a stainless steel screen with apertures that cannot be penetrated by even the smallest fingers. This feature resists climbing and will effectively preclude jumping or diving from the interior edge of the pool. Furthermore, the meshing acts as a full perimeter guard that will prevent advertent and inadvertent pool entry at all stations except the door. The inward swinging door with the overhead hinge will block all diving attempts from the pool entrance which is depicted without a ladder system. The ladder will preclude jumping from the pool entrance. When the door is locked the pool is completely secure.

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Figure 1 - Dome Concept

Figure 4 is a closeup of the polygon design which is portrayed without a ladder system. The entranceway may assume any height, but it is essential that it be inward swinging with a top hinge to prevent swimmers from diving from the entrance; the door is always “in their face.” Once again, the design uses a fine stainless steel mesh to isolate the pool area from deck-side diving and jumping excursions together with horseplay, slip/trip, and missile generation scenarios. The design is debris resistant. It should be observed that this perimeter-hugging layout will enclose even irregular-shaped pools.

DISCUSSION

1. The aquatic industry has traditionally displayed its greatest strength in aesthetic design. This paper merely hints at the possibilities of attractive designs that are functional and safe.
2. High strength meshing provides a wide variety of architectural solutions to the full enclosure concept of pool safety. Small aperture corrosion-resistant meshing precludes climbing on the exterior and interior of the enclosures. If the enclosure is built close to the edge of the pool, no perch is available for pool-side diving or jumping.

3. Merlin Industries, Inc. manufactures a high-tech weave called SmartMeshsm [Ref. 4] which will block sunlight and debris while letting water through. This product may be usefully integrated into the gazebo designs.
4. The illustrated designs are compatible with door concepts that reflect self-closing and self-latching features with locking capability.
5. The dome and polygon enclosures are both compatible with conventional in-pool ladder products.
6. Deck-side activities, including horseplay and miscreant behavior, will not result in pool entry; even missiles are excluded.

REFERENCES

1. Injury Facts , National Safety Council, Itasca, IL, 2002.
2. CPSC RFP; CPSC-P-89-2061. Evaluation of Recreational Diving in Residential Swimming Pools, Aug. 4, 1989.
3. Barnett, Ralph L. and Poczynok, Peter J., “Above-Ground Pool Safety - Mechanical Solution,” DETC2003/



Figure 2 - Polygon Concept



Figure 3 - Dome Design - Details



Figure 4 - Polygon Design - Details

SERA-48690, Proceedings of DETC'03 ASME 2003 Design Engineering Technical Conference and Computers and Information in Engineering Conference, Chicago, IL, September, 2003.

4. SmartMeshSM at <http://www.merlinindustries.com>

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ABOUT THE AUTHOR

Robert Kaplan is a native of Skokie, Illinois. He attended the Chicago Academy of Fine Arts and the Art Institute of Chicago in the early Seventies. He started his professional career as a commercial photographer and soon became a leader and innovator in his field. With his extensive background in photography, film, the new field of video, and model construction, he joined the staff of Triodyne Inc. His responsibilities included photography, exhibit construction, and video production of demonstrative evidence.

In the early 1980's Mr. Kaplan's interests turned toward the new and emerging technology of computer animation. By

the mid-1990's, Mr. Kaplan was one of the pioneers in the use of computer animation in the courtroom.

In 1997, Mr. Kaplan established Eleventh Hour Animation. His company specializes in 3D computer animation for the legal community. He has produced animations for some of the country's largest law firms and has established a reputation for his attention to detail and his expertise in all aspects of the production and admissibility of demonstrative evidence. He has also produced many animations for advertising, television programs (Discovery Channel, History Channel) and architectural and scientific visualization. For more information contact Bob Kaplan at (847)674-6007. Email: bobkeha@rcn.com or visit www.eleventhhouranimation.com.

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