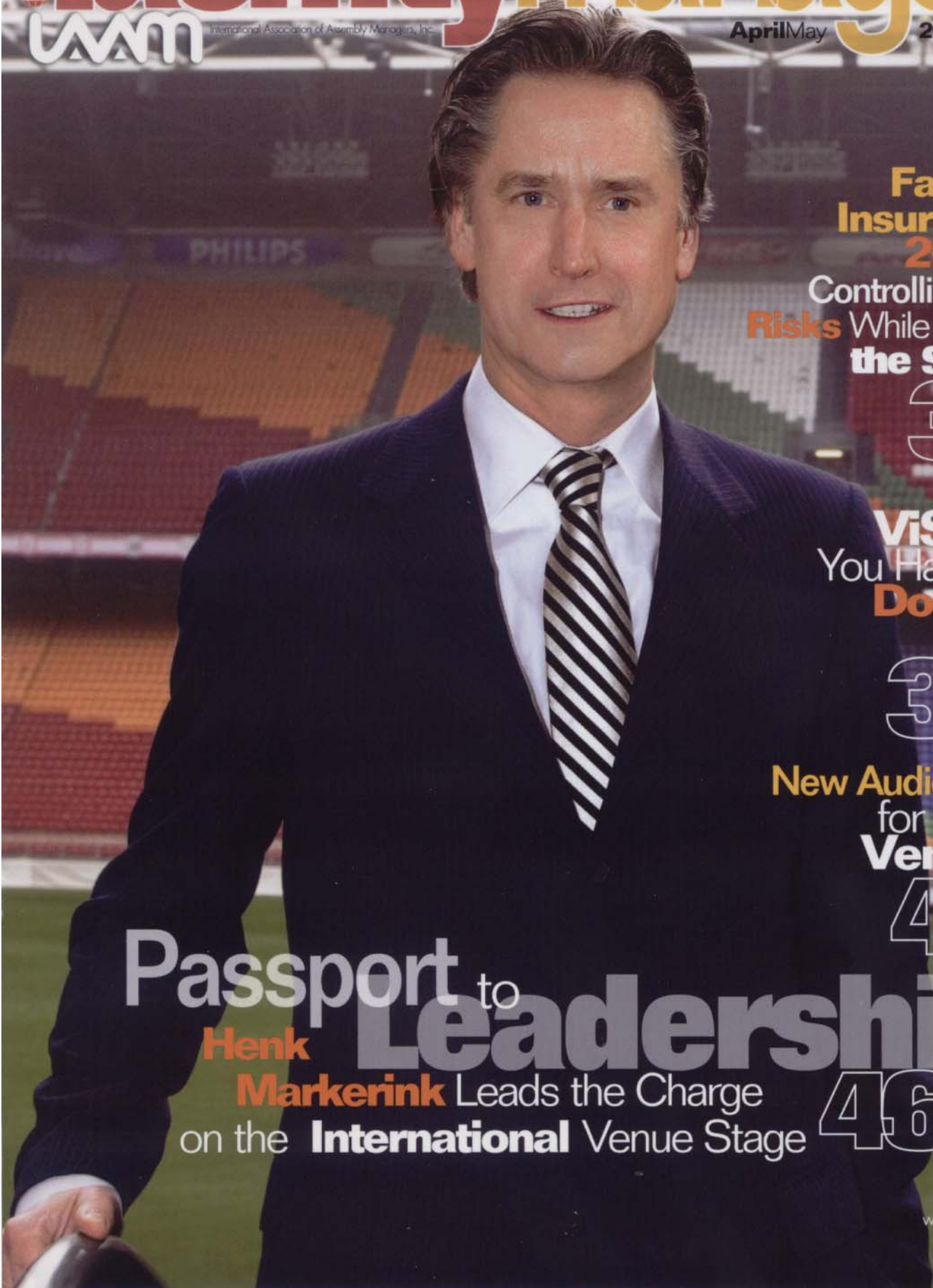


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Facility Insurance 2006:
Controlling the Risks While Filling the Seats
31

VISAT:
You Haven't Done It Yet?
36

New Audiences for Older Venues
40

Passport to **Leadership**
Henk Markerink Leads the Charge on the **International** Venue Stage
46

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By Lester Hensley

Sealing Stadium Expansion Joints: A New Process Yields **Watertight Results**

Most stadiums leak at expansion joints. Owners cringe at the truth and spend thousands, even millions, of dollars each year to repair leaks. The rare exceptions – stadiums completed with watertight joints – are characterized by a design and building process that involves a shift in the traditional way stakeholders relate and execute their work. This process must begin early in the stages of design and planning, and continue until construction is complete.

How can stadium owners ensure that their facility will be leak free? There are several steps that if followed throughout the project, will ensure the stadium remains dry and free of the need for expensive refurbishment.

Owner Responsibilities

Less than half of one percent of a typical stadium construction budget is spent on expansion joints. However, a majority of post-tenancy problems with these structures relate to water ingress. Owners must be receptive to recommendations for superior technologies presented to them by designers and be prepared to allocate additional resources to the design contract to allow proper detailing of joints and their relationships to other structural elements. By spending slightly more of the construction budget on waterproofing, stadium owners and managers can expect trouble-free, dry and lasting joint seals.

Designer Responsibilities

Even the best waterproofing system is going to fail if there are holes in the membrane. Structural expansion joints represent a planned hole in the waterproofing membrane. Designing out expansion joint problems begins with consideration of the following:

Acknowledge the Need for Expansion Joints

Structural materials have limitations. Extreme weather conditions can cause damage over time. Cracks as a result of overstressed materials are nearly impossible to seal and can result in

dangerous structural weaknesses. Properly designed expansion joints will prevent cracking, while carefully chosen sealant systems will withstand weather conditions and keep the facility dry.

Choose Expansion Joint Location Carefully

Corners are a bad place for expansion joints. Do not cast, or use the joints between precast corner units as the place for the structural expansion joints. Instead, cast the corners solid, or weld these precast connections and make them non-moving. Make the structural expansion joint in a straight line just off the corners.

Joints cut completely through the whole structure. Therefore, think about the interior layouts in relation to expansion joints. Considered early enough, it is even possible to hide some joints between back-to-back interior walls thereby eliminating their aesthetic impact as well as the need to bridge them. Finally, select and specify all-metal, high-point-load expansion joints capable of handling small-wheeled catering, cleaning, and other traffic that typically destroys "rubber and rail" joint systems.

Select Structural Supports Wisely

Choose split columns rather than single columns with slide bearing pads. A single column structure results in hard-to-seal conditions around the column caps that create shear conditions for which most watertight joint systems are not designed. Split columns ensure that a system's sealing integrity can be maintained. Retrofit of failed joints around column caps in single-column construction is a specialty that we employ. However, the company's specialized "shear pocket" fabrication required for this type of retrofit comes at a premium. It is better, in new construction instances, to design out conditions requiring this expense.

Size Joints Properly

There are four main facets related to sizing joints properly: expected movement, functional and installation temperature



Interior Floor joint

range, tolerance build-up, and movement capability. Architectural teams must also take the lead for sizing in joint design. Often, the structural team will make recommendations without considering a material and its movement capability and other effects on joint design. This can be avoided if the architectural team selects a technology and takes it to the structural team with the question, "what size joint do we need if we seal the joint with THIS specific technology?" The resulting joint size calculation can then take into account the movement capability of the product or technology type to be used.

Take Time to Find the Right Technology

A trend in the specialty products industry is the tendency of suppliers to commoditize products, thereby removing much of the value essential to their proper performance. The ability and willingness of manufacturers to offer solutions and to fabricate watertight transitions in plane and direction, such as up and down treads and risers, remains a rare differentiator.

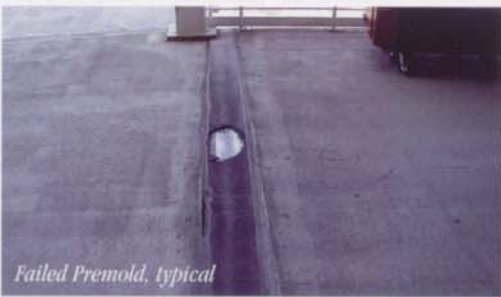
Features in purpose-designed joint systems include integral heat-weldable, thermoplastic rubber flashing sheets for "sandwiching" into deck waterproofing materials on split-slab decks. This ensures watertightness over occupied space below, while heavy-duty aluminum or steel side rails and stainless steel retaining capping strips allow long-term maintenance access to the sealing insert, which in turn is designed to handle cyclical movements.

Think and Design in 3-D

Develop isometric, line-sketch schematics to show all the joints throughout the stadium. Include all changes in plane, direction, and intersection with other materials. This will put the design team on the same page, allowing all participants to identify and design out many problems before construction begins. In addition, show axonometric details of each transition in plane and direction, especially when illustrating transitions between different material technologies, e.g. between a concourse deck joint and a wall joint.

Write Project-Specific Specifications

Stadiums are not the place to use a "cookie cutter" approach to expansion joint design. The specifications for each job must match the specific performance demands of each venue. Make sure to stick with the plan throughout the project to ensure technology continuity and continuity of seal.



Failed Premold, typical



Premold replaced with Thermaflex

TAKE HOME POINTS

- By spending slightly more of the construction budget on water proofing, stadium owners and managers can expect trouble-free, dry and lasting joint seals.
- Properly designed expansion joints will prevent cracking, while carefully chosen sealant systems will withstand weather conditions and keep the facility dry.
- Expansion joints must be considered a critical path item, rather than an added piece at the end of the project.



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Contract Execution

Carefully Select Contractors


Limiting work to a select group of contractors, often those recommended by the expansion joint system manufacturer, can be a huge factor in ensuring watertight joint seals. Because they work closely with manufacturers, these contractors are not likely to underbid the job, keeping change-order cost increases to a minimum, and are likely to be versed in, and willing to remain committed to, a communication process involving the designer, owner representative, manufacturer and general contractor.

Emphasize Expansion Joints During All Construction Phases

Continue to place expansion joints on meeting agendas throughout the construction process. Many subcontractors, including electrical, HVAC, masonry, flooring, façade panel, waterproofing and caulking, work in close proximity to expansion joint locations and they must be aware their work cannot impede structural movement that will occur at expansion joints or compromise the achievement of watertightness at expansion joints in any way. Expansion joints must be considered a critical path item, rather than an added piece at the end of the project.

Conclusion

Sky boxes that won't heat or cool; destroyed flat screen TVs and garbage bags over seats in high-dollar corporate boxes; infuriated, dripped on, highly-compensated athletes; lost concession-vendor revenue; and icy slip hazards are among the numerous complaints stadium owners and managers have endured as a result of leaking expansion joints.

Stadium construction is a complex process. Nevertheless, with notable new construction successes including Citizens Bank Park, and numerous retrofit successes including FedEx Field, Fenway Park and American Airlines Arena, EMSEAL and others, working with like-minded owners, designers, and contractors have demonstrated that a new paradigm for expansion joint treatment is not only possible but also practical. 

Lester Hensley is president and CEO of EMSEAL Joint Systems, Ltd. based in Westborough, Massachusetts.