EDITORIAL

Photo: PCI.

Are We Now Foolishly Preemptively Deselecting a Material or Solution?

William Nickas, *Editor-in-Chief*

My last two editorials have garnered some interesting feedback and I want to further explore how to embrace innovation in the bridge construction and project delivery arena. For me, my thoughts on this topic changed with the Summer 2014 Perspective by Dr. Benjamin Graybeal. In that *ASPIRE*™ article, he outlined a real, pressing challenge for the industry, which is to find the "transformational innovations" and locate "broad-based advancements in our foundational technologies." He then suggested four key strategic opportunities: crack mitigation in structural concrete; alternate concrete matrices; performance under combined loadings; and emerging classes of concrete with enhanced material properties. This made me think about how we might be able to discover and embrace these innovations in the industry using techniques with which we are already familiar.

Early in my career, I worked on a few interesting value-engineering studies. These studies were based on brainstorming sessions in which there are no bad ideas, no barriers, and no criticizing allowed. After the initial brainstorming, alternates were studied to determine viability based on questions such as:

1. Does it serve the intended function?
2. Does the alternate save money or time?
3. Will this lower the life-cycle costs?
4. Will this create a better life-cycle assessment?
5. And more recently, is this alternate a more resilient solution?

Very often these early-stage studies reduce project team's biases. These concepts from the value-engineering studies can also be used to implement more-innovative ideas/solutions into the whole transportation industry. Indeed, there is a history of this occurring.

John Dick, the founding executive editor of *ASPIRE*, wrote a response to Dr. Henry Russell's perspective in the last issue on the history of this publication. In that letter, John wrote of the innovation in the industry in the last 10 years that have already occurred. A couple key points from John regarding change are as follows:

1. At an AASHTO SCOBS meeting in 1988, industry was called upon to explain an agenda item to adopt the new family of bulb-tee-shaped bridge girders. He said it was not an easy assignment. John recalls a discussion that ensued. States discussed who were using concrete strengths other than the traditional $f'_c = 5$ ksi and $f'_{ci} = 3.5$ ksi in their designs. Only a small hand full were permitting as much as 5.5 ksi; one dared to say 6 ksi!
2. Now look at 2006. Without needing to elaborate, the industry was in transition with new beam shapes, larger and stronger strands, self-consolidating concrete, higher strength concretes, shallower sections, longer spans, new admixtures and ingredients, and the list goes on.
3. At that same time, 10 years ago, along came the idea for *ASPIRE*. It has served as a vehicle for sharing these concrete bridge experiences and industry advancements.
4. Peer pressure is amazing and *ASPIRE*'s role must be to continue to be the vehicle to dramatically reveal what the leaders in the bridge industry are accomplishing with modern materials and design.

In closing I will add one more idea to the above value-engineering discussion and John's reflections on influencing change. Maybe a different comparison or basis is needed when we decide to look at change such as contrasting ultra-high-performance concrete (UHPC) with structural steel. Steel weighs 490 lb/ft^3 and costs \$1.35 per fabricated pound. This would equate to a comparative cost of \$17,860/yd^3 of concrete. Just maybe using UHPC at \$1500 to \$3000/yd^3 for more than wall, column, and deck joint connections is not out of the question when one looks at the total bridge system.

ASPIRE authors from the private sector and governmental agencies are telling over 40,000 students and peers to look at what's happened with new code provisions, accelerated bridge construction, and new concrete materials. Let's not "preemptively deselect [UHPC]" by revisiting other strategies to implement. First costs of the material may not seem as high, if one considers the benefit of smaller construction and delivery equipment. Perhaps this could be recognized with better mixing equipment, lighter/thinner solutions, and sandwiched components. Then perhaps, reengineering our whole concrete bridge system and delivery like Dr. Voo did in Malaysia would not seem so radical (see page 36). Let's start addressing changes in our concrete foundational technologies and the four key topics in Graybeal's strategic opportunities with this one innovative concrete material.

Cover
The Wissahickon Memorial Bridge in Philadelphia, Pa., on which Modjeski and Masters was the lead engineer in 1927, was rehabilitated in 2010 by the firm. Photo: Modjeski and Masters.

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