

**AASHTO Technology Implementation Group
Nomination of Technology Ready for Implementation**

Sponsor	Nominations must be submitted by an AASHTO member DOT willing to help promote the technology	<p>1. Sponsoring DOT (State): Texas</p> <p>2. Name and Title: John M. Holt, P.E., Bridge Design Section Director Organization: TxDOT, Bridge Division Street Address: 125 East 11th Street City: Austin State: Texas Zipcode: 78701-2483 E-mail: john.holt@txdot.gov Phone: (512) 416-2212 Fax: (512) 416-2354</p> <p>3. Is the sponsoring State DOT willing to promote this technology to other states by participating on a Lead States Team supported by the AASHTO Technology Implementation Group? Yes or No: Yes</p>
Technology Description (10 points)	The term "technology" may include processes, products, techniques, procedures, and practices.	<p>4. Name of Technology: Sandwich Plate System (SPS Bridge Decks)</p> <p>5. Please describe the technology.</p> <p>The SPS technology has been developed for the heavy civil engineering market and consists of two steel plates bonded to form a sandwich with a compact polyurethane elastomer core. The elastomer provides continuous support to the steel plates and precludes local plate buckling and the need for stiffeners. The flexural stiffness and strength of the sandwich plate is tailored to meet particular structural requirements by selecting appropriate thicknesses for the sandwich elements. The SPS Bridge Deck product has been used successfully as an alternative to conventional concrete and orthotropic steel deck.</p> <p>6. If appropriate, please attach photographs, diagrams, or other images illustrating the appearance or functionality of the technology. (If electronic, please provide a separate file.) Please list your attachments here.</p> <p>Attachment: 2010-12-01 Presentation Slides – SPS Bridge Decks for Accelerated Deck Replacement</p> <p>YouTube video on the manufacturing of SPS Bridge deck panels http://www.youtube.com/watch?v=9g-Y9K3kOJo</p>

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State of Development (30 points)

Technologies must be successfully deployed in at least one State DOT. The TIG selection process will favor technologies that have advanced beyond the research stage, at least to the pilot deployment stage, and preferably into routine use.

7. Briefly describe the history of its development.

SPS has been in development since 1996.

Physical properties, design parameters and production techniques have been established through extensive analytical, experimental and prototype work in conjunction with BASF, Maritime Classification Societies, DOTs, UL, BRE, CABR, KICT and numerous Universities.

SPS was originally developed for the maritime industry and since the first maritime installation on the deck of a P&O RoRo ferry in 1999, over 2.1 million sq.ft of SPS has been successfully implemented in maritime projects. In November 2003, the first SPS Bridge opened to the public in St. Martin, Quebec, Canada. A summary of other bridge installations (~57,000 sq.ft) is given in the table below.

Bridge	Client	Location	Area	Description	Completion
Ovingham	Northumberland CC	Morpeth UK	457 m ²	replacement deck	May-14
Staniforth	Sheffield City	Sheffield UK	48 m ²	pedestrian bridge	May-14
Reeuwijk	Haasnoot Bruggen	Reeuwijk	12 m ²	new bridge	Dec-12
Mettlach	Eiffel Deutschland	Saarland Germany	801 m ²	replacement deck	Oct-12
Hellevoetsluis	Haasnoot Bruggen	Hellevoetsluis Netherlands	26 m ²	pedestrian bridge	Aug-12
Hillegom	Haasnoot Bruggen	Hillegom Netherlands	53 m ²	pedestrian bridge	Aug-12
Diemen	Haasnoot Bruggen	Diemen Netherlands	62 m ²	new bridge	Mar-12
Aalsmeer	Haasnoot Bruggen	Alsmeer Netherlands	32 m ²	new bridge	Mar-12
Cow Bridge	Birse Civils Ltd	London UK	89 m ²	replacement deck	Jan-12
MaFang Bridge 2	ZhaoQing Ta	Shenzhen China	104 m ²	Overlay	Nov-11
Wark Tyne Bridge	Northumberland CC	Northumberland UK	452 m ²	replacement deck	Mar-11
Dawson Bridge	City of Edmonton	Edmonton Canada	1,826 m ²	replacement deck	Jul-10
M6 Pedestrian Bridge	United Kingdom HWA	Lancashire UK	29 m ²	replacement deck	Jun-10
MaFang Bridge 1	ZhaoQing TA	Shenzhen China	512 m ²	Overlay	Jan-10
M6 Pedestrian Bridge	United Kingdom Highways Agency	Lancashire UK	254 m ²	replacement deck	Nov-08
Martin Branch Bridge	Texas DoT	Texas USA	450 m ²	new road bridge deck	Feb-08
Huskisson Bridge	MDHC	Liverpool Docks UK	300 m ²	Overlay	Apr-06
Port Britain Bridge	City of Port Britain	Ontario Canada	80 m ²	new road bridge deck	Oct-05
Schonwasserpark Bridge	NRW	Krefeld Germany	805 m ²	Overlay	Jul-05
U1 Viaduct	BVG	Berlin Germany	52 m ²	Overlay	Nov-04
Lennoxville Bridge	MTQ	Sherbrooke Canada	517 m ²	replacement deck	Nov-04
Shenley Bridge	MTQ	St. Martin Canada	154 m ²	new bridge	Nov-03

Since 2003, other Civil Engineering products have been developed including SPS Grandstands, SPS Floors, SPS Industrial and SPS Protection (blast & ballistic). Significant market gains have been experienced with these products.

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		<p>8. For how long and in approximately how many applications has your State DOT used this technology?</p> <p>In 2008, an SPS Bridge was installed in Wise County, Texas south of Decatur as part of the Innovative Bridge Research and Construction (IBRC) initiative of the Federal Highway Administration. The project location is at coordinates 33.166173, -97.606731.</p> <p>9. What additional development is necessary to enable routine deployment of the technology?</p> <p>Current development activities concentrate on further study and validation of technical issues such as:</p> <ul style="list-style-type: none"> • connection details of the SPS Deck to the supporting bridge girder • joint-less decks (no field welded connection details) • wearing surfaces including lightweight alternatives to asphalt • integrating SPS bridge decks with concrete girders to refurbish an existing bridge. <p>and scaling up from a relatively small number of installations to wide-scale deployment on a nationwide basis.</p> <p>10. Have other organizations used this technology? Yes or No: Yes If so, please list organization names and contacts.</p> <table border="1" data-bbox="467 772 1542 940"> <thead> <tr> <th>Organization</th> <th>Name</th> <th>Phone</th> <th>E-mail</th> </tr> </thead> <tbody> <tr> <td>City of Edmonton</td> <td>Shiraz Kanji</td> <td>780-496-4687</td> <td>Shiraz.Kanji@edmonton.ca</td> </tr> <tr> <td>City of Port Hope</td> <td>Peter Angelo</td> <td>905-885-2431</td> <td>pangelo@porthope.ca</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Organization	Name	Phone	E-mail	City of Edmonton	Shiraz Kanji	780-496-4687	Shiraz.Kanji@edmonton.ca	City of Port Hope	Peter Angelo	905-885-2431	pangelo@porthope.ca								
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<p>Potential Payoff (30 points)</p>	<p>Payoff is defined as the combination of broad applicability and significant benefit or advantage over other currently available technologies.</p>	<p>11. How does the technology meet customer or stakeholder needs in your State DOT or other organizations that have used it?</p> <p>SPS Bridge decks offer the same functionality of conventional bridge decks while having the following advantages:</p> <ul style="list-style-type: none"> • Lightweight (up to 70% lighter than concrete decks). Permits the replacement of concrete decks, increasing load capacity, adding lanes while avoiding the need for girder and pier reinforcement. Achieves longer spans (fewer piers). • Facilitates Accelerated Bridge Construction through prefabrication. • Quality shop fabrication with long service life as fatigue problems inherent in orthotropic steel decks do not exist. • Durable and virtually maintenance free as the steel deck is typically weathering steel and protected by a membrane. <p>12. What type and scale of benefits has your DOT realized from using this technology? Include cost savings, safety improvements, transportation efficiency or effectiveness, environmental benefits, or any other advantages over other existing technologies.</p> <p>Prefabrication and ease of erection simplifies construction and shortens construction schedules allowing for rapid bridge replacement while minimizing impact to the public. For Martin Branch Bridge, the use of SPS allowed for the installation of 3 spans of girders and deck in 4 days. For Dawson Bridge, the use of SPS Bridge decks allowed the construction to be completed in one construction season as opposed to two. Significant cost savings were realized by reduction in construction schedules.</p> <p>SPS is much simpler and more robust than stiffened steel plate and much lighter and faster to erect than reinforced concrete. As a result, in particular for long span bridges, the girders will have significant weight savings. For vehicle bridges SPS Bridge decks with a lightweight wearing surface offers a deck alternative with equivalent weight to a grating deck, but maintains a continuous driving surface thereby minimizing accidents and improving traveler safety.</p> <p>A summary of comparative performance characteristics for various bridge deck types is attached.</p>																				

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		<p>13. Please describe the potential extent of implementation in terms of geography, organization type (including other branches of government and private industry) and size, or other relevant factors. How broadly might the technology be deployed?</p> <p>SPS Bridge decks can be deployed at both the state, local (county and municipal) level in any of the states, and for private bridge owners. The list of installations indicates that the technology can be deployed on a global level.</p>
<p>Market Readiness (30 points)</p>	<p>The TIG selection process will favor technologies that can be adopted with a reasonable amount of effort and cost, commensurate with the payoff potential.</p>	<p>14. What actions would another organization need to take to adopt this technology?</p> <p>SPS is available through Intelligent Engineering's supply partners BigR Bridge and Supreme Steel. Schuff Steel is also a supply partner, but is more active on IE's Civil products SPS Terraces (Grandstands) and building Floors. To use this technology, SPS Bridge decks can be offered with a standard bid provided the project specification allows the use of a steel deck. All other components for the bridge including the girders can follow the usual bid process through TxDOT prequalified fabricators. To facilitate the deployment of SPS Bridge decks, the production facilities for the SPS product should be audited for prequalification. The audit would follow similar requirements to any prequalified steel fabricator.</p> <p>15. What is the estimated cost, effort, and length of time required to deploy the technology in another organization?</p> <p>Not applicable to the implementation of a new bridge deck technology.</p> <p>16. What resources—such as technical specifications, training materials, and user guides—are already available to assist deployment?</p> <p>Technical specifications, design tools, and installation guides are readily available. Design guidelines based on AASHTO design rules are available. All quality control documentation for the production of SPS panels has been developed and successfully implemented.</p> <p>17. What organizations currently supply and provide technical support for the technology?</p> <p>As indicated above BigR and Supreme Steel currently supply the SPS Bridge deck.</p> <p>Technical support and product support is provided by Intelligent Engineering, a sole purpose company that is responsible for the development, commercialization and supply of SPS products.</p> <p>BigR has a demo bridge with and SPS deck and will be showing it at various locations throughout the US.</p> <p>18. Please describe any legal, environmental, social, intellectual property, or other barriers that might affect ease of implementation.</p> <p>SPS is a proprietary product, but competition is guaranteed by having two or more sources of supply.</p> <p>SPS products used in the construction industry reduces the overall weight of materials used in a structure, thereby reducing truck movements and the amount of site waste (sustainability).</p> <p>SPS Bridge decks could be pre-designed (catalogue of designs) and pre-fabricated and stored for immediate deployment. Similarly, these pre-designed structures could be demounted and re-used in other locations. Re-usability is the best form of sustainability.</p>

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