GRIDLINE

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In this edition of the ***Gridline***, we continue to spotlight yet another BGFMA certified member company individual whose many years of experience can be valuable to provide sound advice during plan preparation, fabrication and installation.

Meet Darko Jurkovic, P.E.

Darko Jurkovic was born in the former communist state of Yugoslavia in the region that is now known as Croatia. When he was just six years old, Darko's father uprooted the family to escape President Tito's suppressive government, and settled in industrialized Pittsburgh to seek the American dream. The family's hope and perseverance was rewarded when Darko's father eventually became the successful proprietor of his own machine shop. In the summer following high school graduation, Darko went to work in a machine shop down the street from his father's shop. The job was labor-intensive, and like many young men, this experience influenced Darko to consider a college education. He began by studying drafting at **Community College of Allegheny County**, and eventually transitioned to the **University of Pittsburgh** where he earned a Bachelor of Science degree in civil engineering in 1985.

Drawing on his summer experiences with **PennDOT**, Darko accepted a Philadelphia metro area position with **NJDOT** upon graduation until he saw an **IKG Greulich** posting for a sales engineer in the Pittsburgh area. There he met Gene Gilmore for the first time who gave him a crash course on grid deck technology and provided him the opportunity to flourish at a young age. By 1987, Darko was the Manager of Product Development and Marketing and heavily focused on conducting research on concrete-filled grids. Most of this groundbreaking research was conducted at his alma mater, the **University of Pittsburgh**. His successful efforts to win state matching funds ultimately resulted in the young engineer managing a million-dollar-plus R&D program. This position allowed him to work with the late Dr. Dennis Mertz and Paul Csagoly ("Gang of Four" member) in the development of LRFD code language. It was also during this time that Darko worked with **Mackin Engineering** to develop the first composite attachment of a grid reinforced concrete deck via headed shear studs on the Smithfield Street Bridge in Pittsburgh, which is now the specified method of attachment shown in AASHTO LRFD Bridge Design Specifications and discussed in *Tech-Line Issue #15*.

Late in 1996, **American Bridge** (AB) hired Darko as a Project Manager for their newly formed American Grid division, which was engrossed with the **Tagus River** project in Lisbon, Portugal. This multi-million-dollar international suspension bridge project included a 110,000 square foot widening of the existing grid deck that was originally constructed in 1964. He would later transition within AB to work on all fabricated products, all of which were featured on the complex rehabilitation of structural steel and grid deck for the $112 million historic retrofit of the **Macombs Dam Bridge** project. The 1920s originator of grid decks, AB would later sell their tooling and exit the grid industry, as they had once before in the early 1960s. In 2009, Darko started with **Bureau Veritas** as a Project Manager coordinating more than 20 full-time inspectors to provide in-shop inspection services at over 100 fabrication, material testing, paint and galvanizing facilities for several prominent clients, most notably PennDOT.

In 2013, Darko would join the family oriented atmosphere of **Bailey Bridges** as a Regional Manager and once again be reunited with Gene where he is involved in estimating, bidding, sales and marketing efforts and managing projects for the company.

Darko and his wife of 27 years, Traci, have two sons attending college. In their spare time, Darko and Traci enjoy spending time in the sun and on the beach, traveling to unique destinations around the globe.

Getting into the Swing of It

Since about 1999, most new movable bridges constructed in Florida have included a lightweight solid deck with a concrete riding surface. The vast majority of these bridges have been bascule types and the deck of choice has been a **grid reinforced concrete** or **Exodermic®** deck using lightweight concrete. These deck types protect the structural steel framing members from corrosion while providing a smooth, quiet riding surface that is also bicycle-friendly.

Engineers at **Hardesty & Hanover** were faced with many challenges to design a replacement structure for the existing **Gasparilla Island Swing Bridge**, which had outlived its 50-year design life. Among them, keeping the existing swing span in operation during construction of the new one topped the list since their turning radii overlapped. Minimizing the dead load of the swing span may not have been a unique challenge on this project, but it certainly was a major consideration, as it is for any movable bridge engineer. Selected for its lightweight attributes and strength, an Exodermic® deck was supplied by BGFMA certified fabricator **Bailey Bridges** in Fort Payne, AL. The deck was designed with 115 pcf concrete to span floor beams spaced at 13'-6" thereby eliminating the additional weight of stringers. The 2% cross slopes were achieved by using leveling bolts built into the panel and the crown was placed at the division of two adjacent panels. The weight of the deck, including 2" cover over the rebar, registered a little over 60 psf, excluding the additional full-depth weight between panels and over the floor beams.

The lightweight Exodermic® deck was specified for its structural efficiency. The deck system provided a lower mass that significantly reduced the swing span's weight, inertia, and corresponding power requirements. The deck also serves as a horizontal diaphragm that, in combination with floor beam knee braces, eliminates the need for permanent lateral bracing. The deck was made composite with the main girders and floor beams by welding headed shear connectors to them, which increased the strength and stiffness of the swing span's steel framing. (*Timothy J. Noles, P.E., M.ASCE and Henri Sinson, P.E., "Synchronized Swinging," Civil Engineering, p. 70.*)

The replaced Gasparilla Island Swing Bridge would be established as the "first" in at least a couple categories. Not only would it would be the first installation of an Exodermic® deck on a steel plate girder swing bridge in Florida, but it would also be the first swing bridge constructed in Florida since 1958. Considering the elegance of these structures, we hope it will not be the last.

2017 ASCE/AISC National Student Steel Bridge Competition

Oregon State University in Corvallis, Oregon, hosted the **26th annual ASCE/AISC National Student Steel Bridge Competition (NSSBC)** this past Memorial Day weekend. Leading up to this event, 251 teams competed against each other in 18 regions across the country. Fifteen international teams competed in geographically close regions. From the regional level, 43 schools advanced to the national competition. This year's overall winner in Corvallis, and repeating their performance from last year in Provo, was **École de Technologie Supérieure of Montreal** (Upper NY).

The **BGFMA** was again a proud sponsor at the national level with a donation at the gold level. At the regional level, the BGFMA sponsored the following teams to help finance their endeavors: the **University of Toledo** (North Central Region), the **University of Akron** (Ohio Valley Region), **Penn State Harrisburg** (Mid-Atlantic Region), and the **University of Washington** (Pacific NW). Congratulations to the Zips at Akron for making it to the national competition for the third straight year.

2018 National Student
Steel Bridge Competition
Organizing Sponsors: American Institute of Steel Construction
and American Society of Civil Engineers

The **2018 NSSBC** will be hosted by the University of Illinois Urbana-Champaign, in Champaign, Illinois on May 25-26.

Grid Facts

The service limit states of the current **AASHTO LRFD Bridge Design Specifications** (Seventh Edition, 2014 with 2016 Interims) are intended to provide a serviceable bridge for a specified 75-year design life. Efforts are underway to develop design, detailing guidance and calibrated service limit states to provide 100-year bridge service life. Typical service lives of concrete decks are generally around 40 years. And although the deck would not be expected to last 100 years, there are grid reinforced concrete decks currently in service that have surpassed the specified 75-year life and are well on their way to meeting the 100-year service life ultimate goal. The **South Tenth Street Bridge** (1932) in Pittsburgh and the **Homestead Grays Bridge** (1936) in Allegheny County, PA are just two examples. There are many more examples of in-service grid reinforced concrete decks that are over 60 years old, still in great shape, and likely to surpass the current design life expectation.

More Information

If you would like to receive more information about the features and benefits of grid deck systems, please contact us at **1-877-257-5499** or **bgfma@bgfma.org**. We are also available to make presentations at your office and can offer continuing education credits for professional engineers as a registered provider in New York and Florida.

BGFMA Tradeshow Schedule

Please visit **BGFMA members** at our exhibit booth during the following upcoming bridge engineering conferences:

ABC-UTC Conference	**December 7 - 8**	**Miami, FL**
NASCC the Steel Conference	**April 11 - 13**	**Baltimore, MD**
International Bridge Conference (IBC)	**June 11 - 14**	**National Harbor, MD**
Heavy Movable Structures (HMS) in Orlando, FL	**October 22 - 25**	**Orlando FL**

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Bridge Grid Flooring Manufacturers Association
300 East Cherry Street
North Baltimore, OH 45872
p 877.257.5499 f 419.257.0332