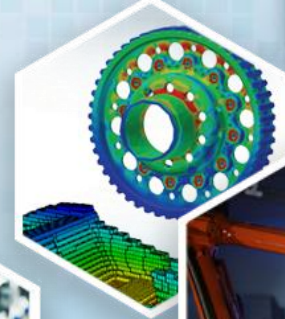


Infrastructure & Construction (I&C) Working Group Overview

John Unser, IACMI/Composite Application Group
October 6, 2021









Motivation for Forming the I&C Working Group



- There is a tremendous need in our country for infrastructure repair
- There is very good fit between composites and many of our nation's infrastructure and construction needs
- Results of survey of IACMI members taken in 2019:

*Which topic should IACMI consider establishing as a **future Technology Area**?*

Votes		Technology Areas/Industries
	30%	Buildings/Infrastructure
	28%	Aerospace
	24%	Mass Transportation
	7%	Consumer Products
	6%	Oil & gas
	5%	Marine

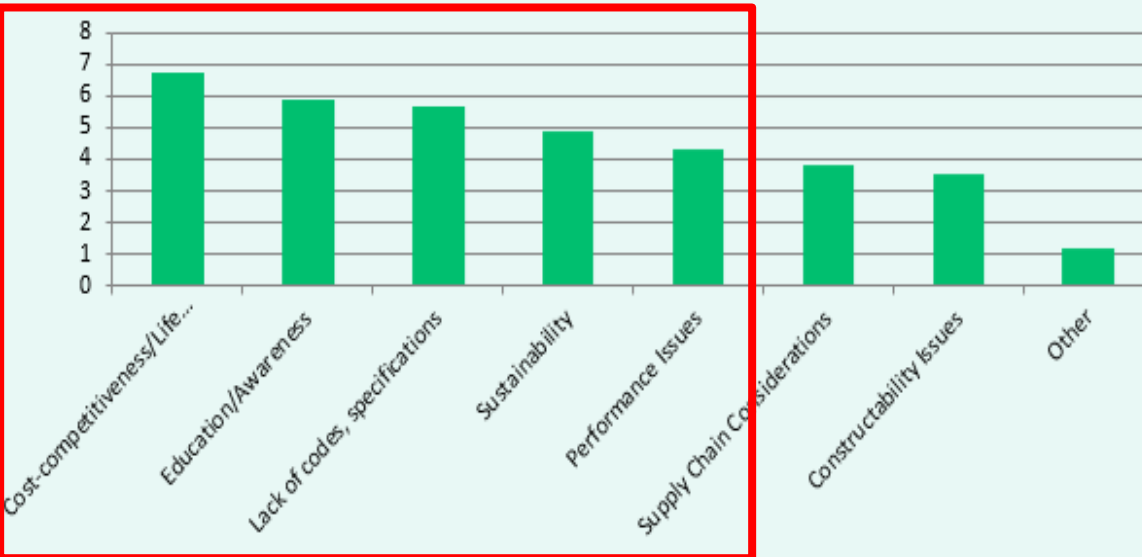
Overview



- ◆ Infrastructure & Construction (I&C) has become a new focus area for IACMI
- ◆ The I&C working group was formed in October 2020
- ◆ The working group has held 5 meetings to date
- ◆ **Mission:** Focus on addressing technoeconomic barriers to mass adoption of composites in I&C applications in partnership with similarly aligned organizations

Addressing Key Barriers

Which barriers should IACMI address? (Rank your top three. You may drag and drop the list to establish your rankings.)



Top 5

- Cost-competitiveness/Life Cycle Costs
- Education / Awareness
- Lack of Codes & Specifications
- Sustainability
- Performance Issues

Objectives of the I&C Working Group



Spur the use of FRP composites in Infrastructure & Construction applications by reducing or removing barriers to their adoption. This will be accomplished by:

Cost

- Illustrating the life cycle cost benefits of FRP composites relative to traditional materials of construction

Education

Increasing the awareness of FRP composites in the civil engineering and construction communities

Standards & Tools

- Assisting in the creation and dissemination of new standards, specifications and modeling & simulation tools that help design engineers become more comfortable designing with composites
- Creating, managing and publicizing industry-led

Projects

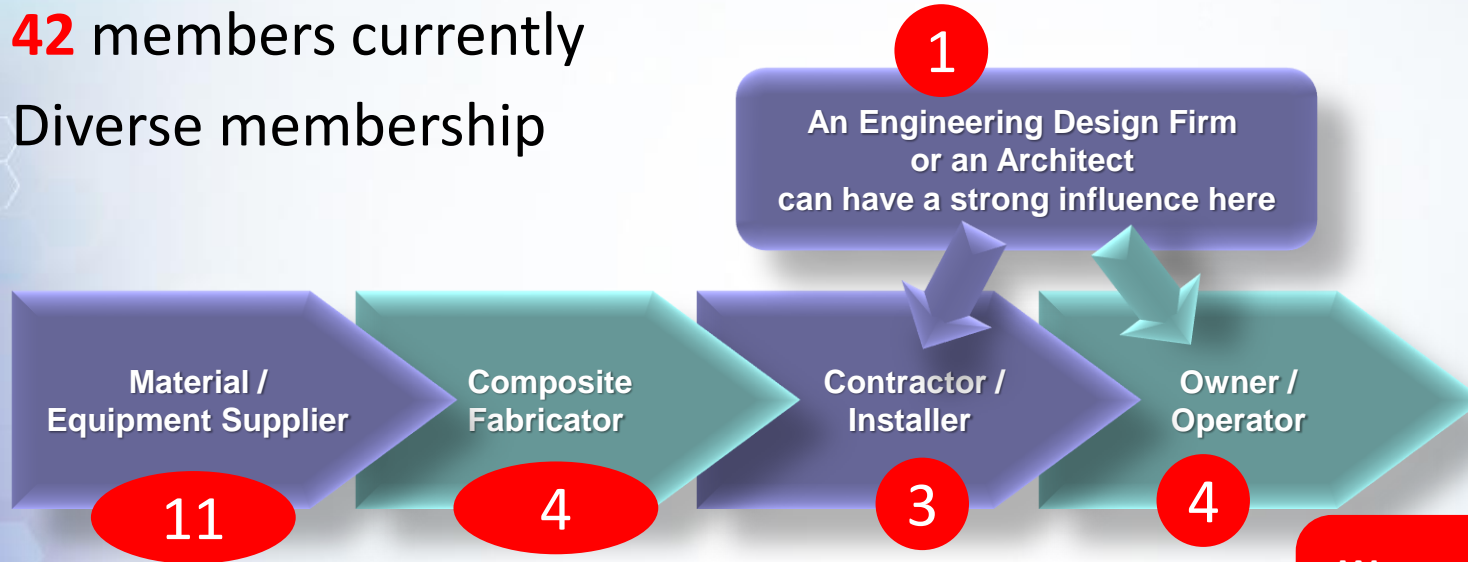
- Demonstration projects that illustrate the benefits of FRP composites
- Research projects that improve the performance of FRP composites

Membership Spans the Entire Value Chain for I&C



- 42 members currently

- Diverse membership



- + 19 others

Universities, federal labs, associations, consultants....

We continue to look for additional members across the value chain

Monitoring Infrastructure Legislation

- The Senate passed a \$1.0 - 1.2T infrastructure bill in July
- Results in the House ???



Screen Shot from CNN

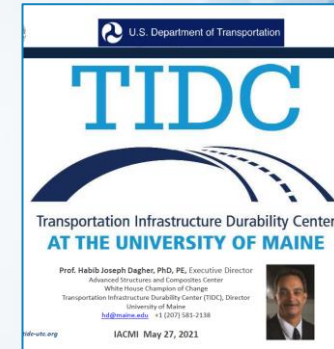
New Proposed Infrastructure Funding	ASCE Report Card Category
\$110 Billion for Roads, Bridges, Major Projects	Bridges, Roads
\$11 Billion for Pipeline Modernization, Trucking Safety, and Traffic Safety	Energy, Roads
\$39 Billion for Public Transit Repair	Transit
\$66 Billion for Passenger and Freight Rail Repair and Expansion	Rail, Transit
\$7.5 Billion for Electric Vehicle Charging Infrastructure	Roads, Energy
\$7.5 Billion for Low Carbon and Electric Buses and Ferries	Transit, Ports
\$17 Billion for Port Infrastructure	Ports, Inland Waterways
\$25 Billion for Airport Maintenance and Resilience	Aviation
\$50 Billion for Cyber Resiliency, Wildfire Management, Flood Mitigation, Coastal Resiliency, Weatherization, and Ecosystem Restoration	Broadband, Dams, Energy, Levees, Stormwater
\$55 Billion for Water Infrastructure	Drinking Water, Stormwater, Wastewater
\$65 Billion to Bridge the Digital Divide	Broadband
\$21 Billion in Environmental Remediation	Hazardous Waste
\$73 Billion for Nation's Power Infrastructure	Energy

Table from ASCE



THE COMPOSITES
iacmi
INSTITUTE

-
- A graphic for the ASCE 2021 Report Card for America's Infrastructure. It features a map of the United States composed of various colorful icons representing infrastructure elements: bridges, trains, houses, trees, airplanes, trucks, buses, power lines, light bulbs, and other symbols. Below the map, the text reads: **2021 REPORT CARD** FOR AMERICA'S INFRASTRUCTURE **ASCE**.



Theme	Topic	Day 1 (June 21)	Day 2 (June 22)	Day 3 (June 23)	Day 4 (June 24)		
		Composites Infrastructure & Life Cycle	Transportation & Waterfront Structures	Building & Industrial Structures	Sustainability, Resilience, and Design		
Presentation 1	Application Overview	Bridges	Waterfront Protection	New Construction	Concrete Reinforcement	Utility Structures	
	Overview with ASCE	Vehicle deck	Seawall Piling	Concrete Strengthening Applications	Rebar (vehicular decks)	Poles & Crossarms	
Presentation 2	Infrastructure Report Card and Future World Cities	Bridge Girders/ beams	Fender/Pile Systems	Composites JOI for Architects	Concrete Strengthening Details	Rebar for Hardened (structures)	Electric Grid Solutions
Topic	Topic	Bridges	Water / Wastewater	New Construction	Concrete Reinforcement	Concrete Reinforcement	Specialty
		Life Cycle for FIP Composites in Infrastructure	Pedestrian Bridges	Equipment Applications	Architecture Field Applications	Rebar (precast decks / residential walls)	Heavy Civil / Infrastructure Projects
Presentation 3	ASCE for FIP Composites in Infrastructure		Bonus Panel (End-User) Applying Composites For Bridges (40min)		"Design Inspiration" Applying Composites For LIFT Design Standard (40min)		
Presentation 4	ASCE Looking					Bonus Panel (End-User) Applying Composites For Reinforce and Repair Concrete (40min)	
Day	1	2a	2b	3a	3b	4a	4b total
PDH	2.0	1.5	1.5	2.0	2.5	1.5	12.5



Center for Integration
of Composites into
Infrastructure

Accelerating Impact through Partnerships

Francisco De Caso, Ph.D., LEED A.P.

A Parallel Path Strategy

1. Identify & secure funding for I&C-related projects
 2. Develop a list of potential I&C projects
 - ◆ Research projects or
 - ◆ Demonstration projects
- ◆ Rationale: **Have projects that are already well-defined** once funding becomes available

Keeping an Eye Out for Funding Opportunities



- Tom Harman from FHWA presented at I&C working group meeting in August and made us aware of this Every Day Counts (EDC) newsletter



- We are watching for the 2022 EDC funding announcements to be released in the Nov-Dec timeframe

Defining Potential R&D Projects



- Use of fire-resistant Trimer resin for I&C applications
- R&D projects with FRP rebar made with Elium resin
- Use of FRP elements for rural community infrastructure
- Use of recycled material from wind turbine blades in I&C
- Modeling the creep of FRP rebar
- Graphene / low cost carbon fiber composites for I&C

RESIN TECHNOLOGY FOR THE RAPID
MANUFACTURE OF HIGH-PERFORMANCE
FIBER REINFORCED COMPOSITES

Morgan County Bridge



NEW BENDABLE
COMPOSITES REBAR

Opting into the I&C Working Group



◆ If you would like to “opt in” to the I&C working group, send an e-mail to these 3 people:

- ◆ Kim Hoodin khoothing@iacmi.org
- ◆ John Unser junser@iacmi.org
- ◆ Joe Fox foxconsulting147@gmail.com