B2 Concurrent Session – "Non-Steel Reinforcements"

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Toys – Examples

- Pass around rebars, (note the labels)
- Dowel bar,
- Dowel tie connector,
- Etc.

Soon in TMS 402 as Appendix D

Workshop on Research in FRP Composites in Concrete Construction
October 22-23, 2004 – San Francisco California

Sponsored by:
National Science Foundation

With the Support of:
ACI International & ACI Committee 440
ISIS Canada

ACI 440-D Formulated Workshop (When MP chaired)
Identification and Prioritization of research areas for FRP reinforced concrete and masonry structures
 Contributed to the identification prioritization of a large agenda of needed Research.
FRP Rebar Work & Docs

ACI 440 - Fiber-Reinforced Polymer Reinforcement:

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Big deal is the Ballot Results: “Code Requirements for Structural Concrete Reinforced with GFRP Bars and Commentary”

- Subcommittee Activities of ACI 440 (12): (partial list)
  - 440-D Research Development and Applications
  - 440-F FRP-Repair-Strengthening
  - 440-H FRP-Reinforced Concrete
  - 440-I FRP-Prestressed Concrete
  - 440-J FRP Stay-in-Place Forms
  - 440-K FRP-Material Characteristics
  - 440-L FRP-Durability
  - 440-M FRP-Repair of Masonry Str

Published Docs by ACI 440: (Samples)

- ACI PRC-440.10-21: Fire Resistance of FRP-Strengthened Concrete Members – TechNote
- ACI PRC-440.2-17: Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures
- ACI PRC-440.3-12 Guide Test Methods for Fiber-Reinforced Polymers (FRPs) for Reinforcing or Strengthening Concrete Structures
- ACI PRC-440.4-11: Prestressing Concrete Structures with FRP Tendons
- ACI PRC-440-07 Report on Fiber-Reinforced Polymer (FRP) Reinforcement for Concrete Structures
- ACI SPEC-440.5-08 Specification for Construction with Fiber-Reinforced Polymer Reinforcing Bars
- ACI SPEC-440.6-08(17) Specification for Carbon and Glass Fiber-Reinforced Polymer Bar Materials for Concrete Reinforcement
**Related Items and Docs**

- ASCE 74 – New Standard for Load & Resistance Factor Design (LRFD) for Pultruded Fiber Reinforced Polymer (FRP) Structures
  - Patterned after the AISC for steel structures
  - Presented at the recent Pultrusion Conference 2021
  - Resolving comments from Public Ballot

**Other Related Docs.**

- AASHTO - AASHTO Guide Specifications for Design of Bonded FRP Systems for Repair and Strengthening of Concrete Bridge Elements (being updated)
- New Edition of TMS 402 (Bldg Code for Masonry Structures will contain provisions for FRP-Reinforced Masonry (public ballot stage)

**ACI 440 Docs in Process**

- Code Requirements for Structural Concrete Reinforced with GFRP Bars and Commentary
- 440.ZR Guide for design of circular concrete-filled FRP Tubes (CFFT)
- SPEC 440.X (Construction Specification). It will be issued after the Fall convention.
- PRC-440.10-21 (TechNote on Fire Resistance of FRP Strengthening Systems), available as of this past weekend for purchase from ACI.

**Future and Innovative Items**

- Innovative: precast modular-units with rapid assembly time with GFRP & BFRP reinforcement to eliminate corrosion-related maintenance and provide higher resistance to Environment conditions.
- CFRP remains high on the list for strength and other material properties.
GFRP Bars - Cage Assembly (slide by Toni Nanni)

Summary - Aspects of GFRP Use

**PROs**
- Reduce Corrosion
- Quick installation
- Light weight
- Assembly time savings
- Save shipping costs

**CONs**
- Bent-shapes need to be pre-fabricated by pultruder
- No on-site bending of GFRP (unless thermoplastic)
- “Skin-itching” (protective clothes should be worn)
- More GFRP than black steel bars are needed

Civil, Construction, and Environmental Engineering