

Minutes

ACI 440-J Stay-In-Place Formwork

Sunday, October 23, 2016

3:30 pm - 5:00 pm

Philadelphia Marriott Downtown, Philadelphia, PA
GRAND BALLROOM SALON H

Chair: Amir Fam

ATTENDENCE

Officers

Amir Fam, Chair
John Busel, Co-Chair
Will Gold, Committee 440 Chair

Subcommittee members:

Gregory Bond
Tim Bradberry
Hayder Rasheed
Pedram Sadeghian
Doug Tomlinson

Guests:

Mark Green
Hezem Jadellah
Akram Jawdhari
Radhouane Masmoudi
Martin Noel
Val Sylaj
Rudi Seracino
James St. Onge

1. **Welcome and Introductions**

- Amir Fam called the meeting to order at 3:35 pm.
- The attendees made self-introductions.

2. **Approval of the agenda and minutes**

- Will Gold moved to accept the agenda as revised. Seconded by Hayder Rasheed. Motion passed.
- Will Gold moved to accept the minutes as written. Seconded by Doug Tomlinson. Motion passed.

3. **Review of the 2nd draft Design Guide**

- Amir Fam reported on the newest version of the document. There is a current draft has been developed for the past 2 years.
- The guide addresses flexure loading and other situations.
- The guide has limitations due to the knowledge of the type of products manufactured. He added that the fiber orientation found in repair is more straightforward that what can be found with filament wound structures due to the number of variations of the angle of the fibers. He noted that the standard pipe construction is +/- 55 degrees which is the type of hollow tube could be found in this type of construction. He added that this application is intended to use products that are standard so that custom configurations are not unnecessarily complicating this guideline.
- Several task forces were identified to address the gaps in the document. Presentations during the meeting will be given to provide an update on what has been learned since the last meeting.
- The committee discussed the inclusion of both circular as well as non-circular sections. The approach was based on available product. It was suggested that non-circular could be added for consideration in this document.

ACTION: Dr. Masmoudi volunteered to provide information regarding non-circular

4. **Progress in addressing gaps identified in last meeting**

- James St. Onge presented his findings of the +/-55 angle ply FRP tubes testing investigation. Pedram Sadeghian offered comments relative to the data that showed huge gaps in the modeling. Further investigation was done on biaxial loading and after an extensive literature search, it was learned stress strain behavior is a function of boundary conditions in terms of the aspect ratio of the coupon and the level of fiber discontinuity as a result of the cut-off edges.
- Coupon testing is acceptable for uniaxial tension but due to complex biaxial loading behavior will be challenging to simplify for design. Future work involves more search of literature.
- Amir Fam summarized the key elements of the charts and noted that more fiber added to the hoop direction also increases the longitudinal tension which is not what you would assume. This is a problem that needs to be addressed and further understood. He added that before we go to a committee ballot, we needed to have a better modeling approach so we do not have such large gaps.
- Amir Fam stated the other issue is phi factor. Pedram presented the findings on behalf of Ayman Okeil on the reliability assessment under bending for CFFT.
- Pedram provided an overview of the methodology for the evaluation and presented the results of the simulation. The recommendations from this study indicate that the phi factor may be increased for flexural design. More data is needed to validate the results. Dr. Masmoudi offered test data to help with the evaluation.
- The committee discussed the amount of reinforcement needed in the tube. Amir Fam justified that there could be a small amount of steel reinforcement used because we do not have the typical corrosion issues. Amir Fam noted that the tube needs to be the

main load bearing element in this application. Will Gold noted that we need to be careful because it is fine to use FRP reinforcement but the use of steel could be imposing on another ACI committee.

- Amir Fam suggested the committee finalize the “55 issue” over the next 2-3 months in order to complete the next iteration of the draft document so that a subcommittee ballot can be executed.
- The committee discussed the inclusion of some sort of internal reinforcement due to certain situations such as exposure to fire.

5. **Additional gaps in document and assignments**

- The committee felt that this document should consider including state of the art research. It was suggested that this committee document stay focused on practice and knowledge.

6. **Adjourn**

- Amir Fam adjourned the meeting at 4:45 pm.

Respectfully submitted,

John Busel