

Nov 9, 2009

Attached Awning PMTG – conference call notes

John Gant, chair, Michelle Sahlin, Don Smallwood, Ross McCluney, Willie duPont, Ray McGowan

1. The research is moving along well and receiving good attention by the researchers, but Dr. McCluney has kindly notified the chair that the project team is behind on the Task 1 of reviewing existing research and documentation. This should not impact negatively the delivery of the one deliverable: the final report on January 17th. A draft report will be delivered to this PMTG in mid-December for review and comments.
2. Dr. McCluney and Mr. duPont were hosted at the Glen Raven plant and the Mermet plant in South Carolina. Key lessons were that fabric structures at the micro-level are non-uniform and irregular, and not likely to be feasible to model. Therefore, improved optical property lab measurements of fabrics seem appropriate. Two measurement methods are appropriate. First is of the bidirectional scattering distribution function (BSDF) which is the directional distribution of radiation transmitted and reflected by the fabric for each of many directions of incidence. This complex measurement requires automated radiometric measurement instrumentation and is generally expensive. LBNL is using its research class BSDF measurement device on a variety of fabric samples from the industry. The second is an integrating sphere measurement whereby an integrating sphere radiometer measures the specular (unscattered) component and the diffusely scattered component of the transmitted radiation separately, either over a range of wavelengths or, through the use of a solar simulated source, over all wavelengths in the same beam. It is hoped that the LBNL measurements will reveal that most awning fabrics possess an approximately Lambertian diffuse scattering component (same transmitted intensity for all emerging directions) so that simpler separate specular and diffuse transmittance measurements can be made. Perhaps a useful follow-on research project would be to explore the development of a special testing apparatus adaptable for the varied patterns used in awning fabrics. If so, the project will offer some possible optical testing strategies to consider.
3. Close up photography of typical acrylic fabrics was shared, which demonstrates some questions to consider regarding color stripes or patterns which may be difficult to measure independently from each. The problem will be studied further. An area weighting by fabric area color may be feasible, if those “solid colors” are independently measured (most are). Spectrophotometers typically have an approximately 1 cm diameter, across which a sample is placed. For accuracy, only one color should be seen in that area. A larger integrating sphere might be used, though they are rare. This may be another area whereby research would be fruitful for the development of a modest cost specialized optical instrument for the awning fabric industry.
4. The plant tours reinforced the belief that most fabric manufacturers do not have the equipment or staff to perform the needed optical testing. Equipment cost is prohibitive

for the spectrogoniometric photometer able to do the job completely, adding to the need for a less expensive but adequate test method.

5. The project team is developing a more robust database of reference documents than originally expected. Dr. McCluney will review research papers and Mr. duPont will review test methods to be placed in the attached awning and shade reference database.
 6. At the NFRC membership meeting next week in San Antonio, it is expected that the Awning Task Group will have 10 – 15 minutes; the one agenda item will be a presentation on the direction and status of this research project. A brief report on the project will be made at the Research Subcommittee meeting as well.
- Respectfully submitted by John Gant