The Challenges of Modelling Solar Shading Products and their Impact on the Built Environment

Luigi Venturi Beng, MSc – luigi.venturi@concertus.co.uk

Dr Deborah Andrews, Zoe De Grussa PhD Researcher and Dr Issa Chaer, London South Bank University
Aims:

- Assess if the performance gap between the real case study data and simulation affect the adaptation strategy choices for designers which in turn could benefit mitigation of climate change.
- Evaluate the accuracy of thermal modelling with internal shading in energy simulations during extreme climate events.
- Review if solar shading devices are simulated correctly in thermal models.
- Evidence whether thermal simulations can predict risks of overheating in buildings.

>> Verify how thermal dynamic simulations assess overheating conditions in buildings, considering their hours of exceedance, daily weighted exceedance and upper limit temperature during extreme climate events.

(CIBSE TM52 and TM59)
Methodology:

**Step 1.** Real World Monitoring

- Operative, Air, Glazing Surface Temperatures and Lux data collected during Summer 2016.

**Step 2.** Building Modelling and Dynamic Simulation

- Modelled building in IES thermal modelling software and simulated building performance

**Step 3.** Comparison of Real World and Simulation

- Comparisons made between real world data and thermal simulation with future weather scenarios DSY1,2 & 3 and TRY weather data.

**Step 4.** Optimisation Evaluation

- Solar shading modelling and real data comparisons evaluated to identify key issues within shading modelling
Results:

Operative Temperature Comparison between Case Study Real Data & Simulated Weather Projection (test day 08/09/2016) - With and Without Internal Shading -

![Graph showing operative temperature comparison](image_url)

Key:
- Real Case Study Data - No Blind
- Real Case Study Data - With Blind
- 2080 - HIGH 90%DSY3 - No Blind
- 2080 - HIGH 90%DSY3 - With Blind
- IES Standard - TRY - No Blind
- IES Standard - TRY - With Blind
Conclusion:

• The current and future weather projections used in this study appear to be obsolete when compared with real-time data collected during a London-based study during an extreme weather event.

• Current modelling of passive shading interventions indicates that they have a minor impact on the indoor environment which differs from real-world environmental data collection and analysis.

• Building software first omitted the solar heat gains during the extreme weather event and the subsequent mitigation effect of the blinds.

• Evident gap between current manufacturer product data and input parameters in building modelling for solar shading.

• Further longitudinal studies of real-world data and comparative simulations is required to reduce the performance gap and improve passive design optimisation strategies.

Thank you for Listening!