Digital Twin Technology for Measuring Thermal Bridging in Building Envelope Systems

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Overview

To Mitigate Thermal Bridging:

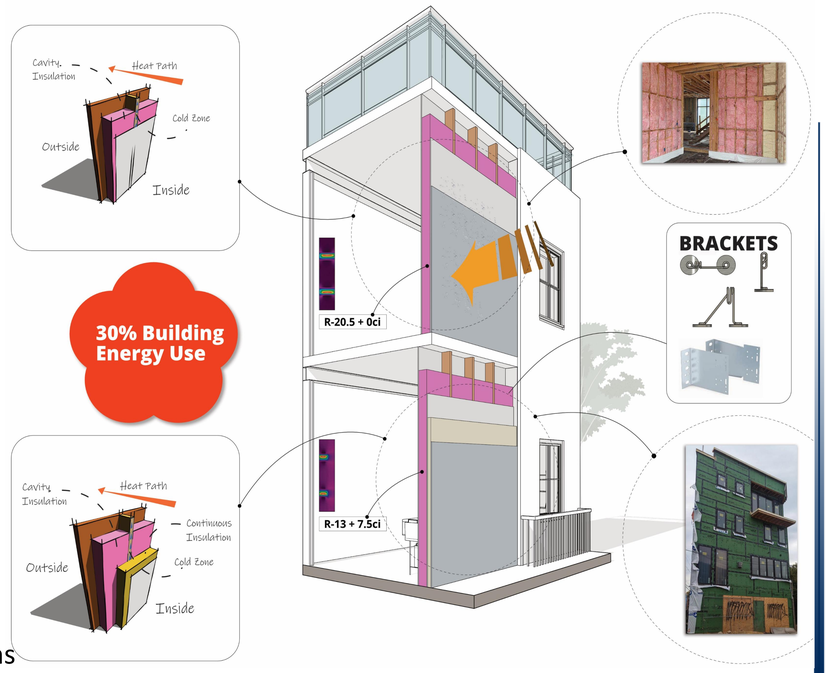
- Adding continuous insulation (ci) layers.
- Increasing insulation thickness
- Improving thermal conductivity of insulation.
- Incorporating vacuum insulation panels (VIPs).

Methods for Assessing Thermal Bridging:

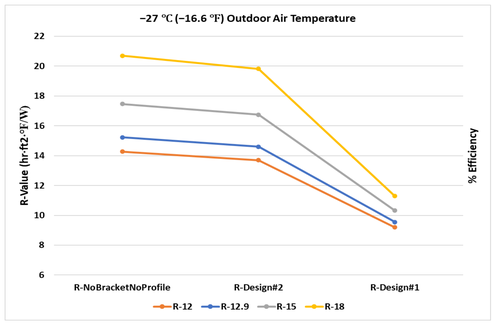
- Experimental analysis
- Computer simulation

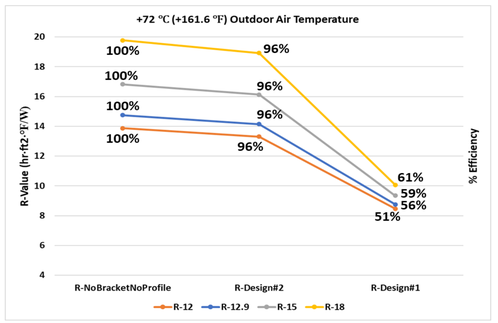
Design Challenges:

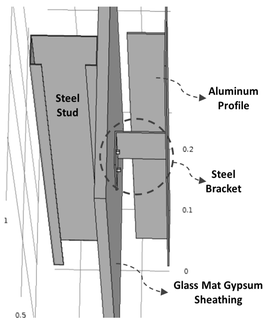
- Experimental analysis – Thermal spot performance
- Computer simulation– No count for real-world variations

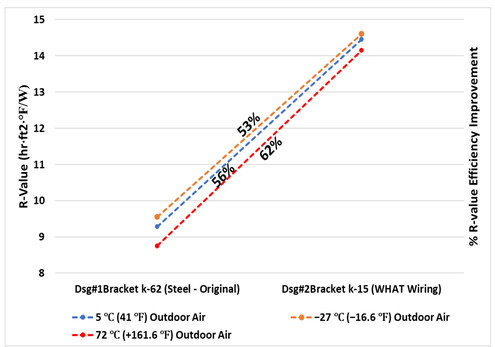


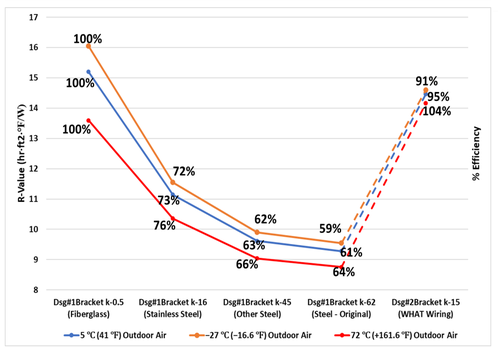
DT Application Example

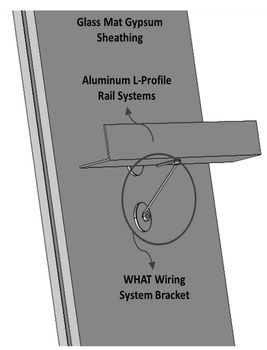




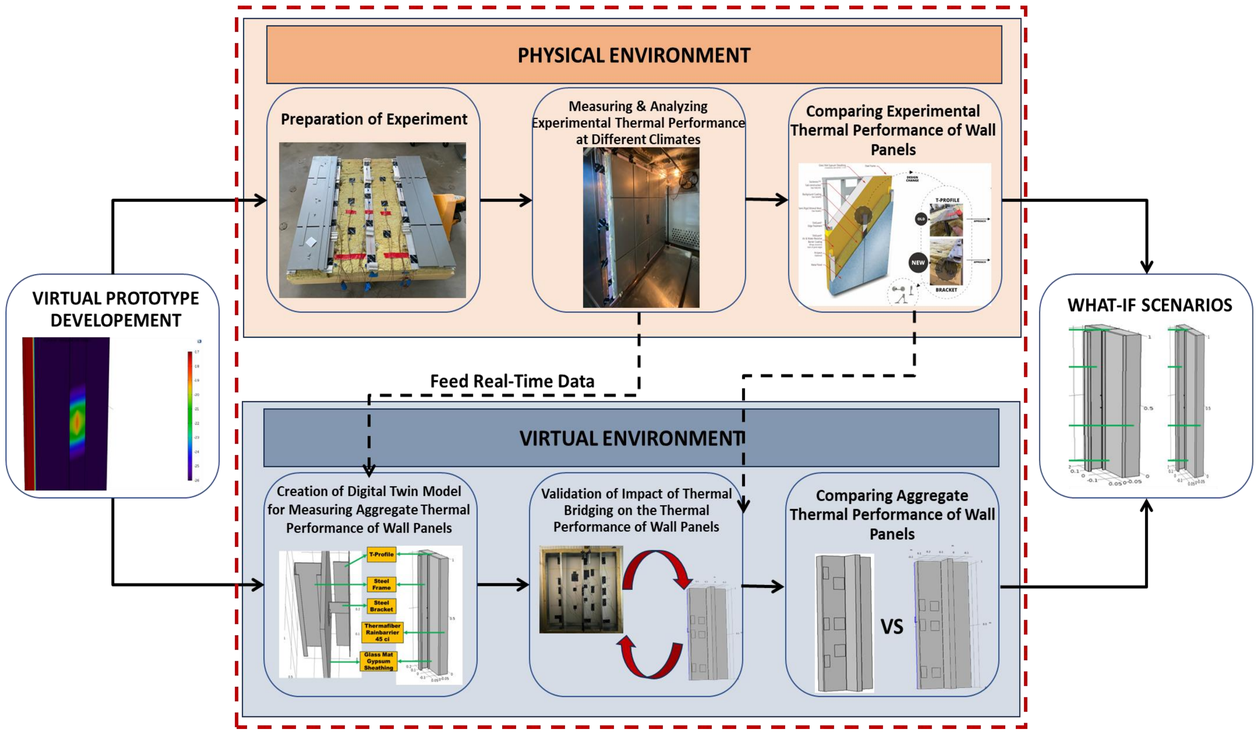








Digital Twin (DT) Model



Key Contributions

- ❖ Assist designers, researchers, and building scientists in using DT platform to assess 3D effects of thermal bridging on building envelope thermal performance.
- ❖ Reduces reliance on experimental testing and lowers labor demands.
- ❖ Enables quick evaluation of multiple “what-if” scenarios within a short timeframe.