INSULATED METAL PANELS: DESIGN AND CONSTRUCTION CHALLENGES

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ABSTRACT

Exterior insulated assemblies are growing in popularity due to changing code requirements with regards to thermal resistance for opaque wall assemblies. Simply installing batt insulation inside the stud cavity is not sufficient any more. Moving forward, the now obvious thermal benefits of continuous insulation combined with improvements in technology and manufacturing over the last 10-15 years have propelled exterior insulation assemblies to the forefront of envelope solutions. Insulated Metal Panels (IMP's) are one of the exterior insulation options that Owners, Architects and Engineers now consider an attractive, cost effective, all-in-one building envelope solution. IMP's are being used on a growing number of projects as the air, vapour, moisture barrier, cladding and insulation, or a combination thereof. Designing and constructing wall assemblies with IMP's can be a simple and effective method of enclosing a building, but it may pose challenges, especially on complex geometric buildings. Challenges could include integrating the IMP's with other building envelope assemblies or achieving the desired airtight and thermally efficient building envelope from an installation perspective.

The learning outcomes of this presentation include the following:

1) Understand the basic building science principles behind various IMP systems on the market today. Compare the different panel types including the metal skins, paint coatings, and the various insulation cores (e.g. polyurethane, polyisocyanurate, semi-rigid mineral fibre and expanded polystyrene insulation). Discuss the impact that insulation core choice has on the thermal performance and the impact on life safety like NFPA 285.

2) Understand the various types of projects where IMP systems have been used (warehouses, cold storage facilities, food processing plants, commercial buildings, shopping malls, prisons, office buildings, community centers and swimming pools).

3) Familiarize oneself with typical building envelope and architectural detailing for IMP systems, including several details showing typical construction of IMP systems and installation methods including cut joints, interlocking shaped joints, termination and transition details. We will also discuss the impact of horizontal and vertical panel orientations.

4) Understand the implications of structural backup wall material selection. Typical backup walls for IMP's include cast-in-place concrete, steel stud, and concrete block walls. The presenter will review and discuss the limitations of the panel systems with each structural backup wall assemble with regards to site tolerances and the impact on the whole system.

5) Learn about some challenges of maintaining the system's excellent thermal performance in the field around typical building conditions at penetrations, terminations, and openings. We will review the thermal performance of the assembly and how to detail at openings, wall terminations and penetrations and we will explore what can be done to minimize the effects of thermal bridging through this assembly at these locations.

6) Review several project case studies and discuss the challenges and successes of using an IMP system. We will focus on construction sequencing and general contractor's understanding of the system. We will learn how to educate the contractor before construction begins so they can coordinate and properly sequence the installation of membrane pre-stripping around openings, penetrations and various other tie-ins.

7) Learn what general design considerations to look out for relating to architecture, aesthetics and function. Functional considerations include location, elevation and proximity to the public. We will discuss how to provide an effective and beneficial building envelope.

8) Learn about common post construction problems, including impact damage, inadvertent structural loading, inter-storey drift and panel replacement. Review repair options and methods and overall maintenance of these assemblies.

CONCLUSION

What is easily drawn on paper can pose challenges in the field. Attendees will learn about the IMP system from a building envelope consultant's first-hand experience. IMP's problems will be presented and discussed. Attendees will be equipped with practical solutions to take into the pre-construction stages of a project to avoid unforeseen challenges in the field and to avoid potential delays.

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