

**Collaborative Seminar Series on
Responsible Use of SCMs
in Performance-Based Specifications**

Owners Perspective

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Agenda

- What Do Owners want?
- Why Would an Owner Want SCMs in Concrete?
- Why Would an Owner Want to use Performance Specifications Concrete?
- Why Would an Owner Not Want Performance Specifications Concrete ?
- How Can an Owner Ensure that SCMs are used Responsibly in Concrete?
- Integrated Design Process (IDP)
- York University Computer Science Building

What Do Owners Want?

- Owners want to make money.
- Governmental owners want to deliver services and meet their objectives cost effectively.
- All owners want to be leaders in their chosen field.

95:5 Rule

90 to 97% of the energy that buildings consume occurs during useful life of the building, after construction is complete. The embodied energy in the materials used to construct the building is a relatively small amount.

Efforts should therefore be focused on designing for low maintenance and energy consumption during the life of the structure.

1:10:200 Rule *

1	Cost of construction
5-10	Operating costs
200	Value of productive satisfied, comfortable human resources

The value performance of the people within a building overwhelms the construction and operational cost.

Small increases in worker or user productivity can more than offset additional construction and operating costs.

* A commercial view of sustainability; Royal Academy of Engineering, Construction Industry Council, Stanhope plc.

Why Would an Owner Want SCMs in Concrete ?


- SCM use in concrete is the "State of the art"
 - ▶ In most cases when you order concrete you will get slag or fly ash unless you specifically request not to receive SCMs
- Strength
- Durability
- Environmental Responsibility "Doing the Right Thing"
 - ▶ SCMs can contribute to 2 CaGBC LEED points
- Cost effectiveness

- In a nutshell, when used properly SCMs make better quality, longer lasting, more cost effective concrete.



Cementitious Materials

- What matters is:
 - ▶ How they are used and
 - ▶ How they perform





Royal Bank Tower,
Toronto 1973
20% Fly Ash
55 MPa Spec
Strengths as high
as 70 MPa



Why Would an Owner Want Performance Specifications Concrete ?

- State of the art
 - ▶ Most specifying bodies are moving quickly away from prescriptive/restrictive specifications and toward performance specifications (CSA A23.1, NBC/OBC, MTO, etc.)
- Competitive bids
- Enhanced performance
 - ▶ Every year there are new mix design options and improved technology
- Enhanced cost effectiveness
- Liability reduction

Why Would an Owner Not Want Performance Specifications Concrete ?

- Lack of familiarity
- Lack of trust in performance criteria
- Lack of trust of suppliers
- If Performance requirements are impossible to define in performance terms

- Almost all of these objections are part of the learning curve and can be addressed in the designing and building process

Prescriptive Specifications

More often than not prescriptive specifications:

- Are too conservative
- Usually out of date
- Stifle development
- Can conflict with required performance
- At worse guarantee poor performance



How Can an Owner Ensure that SCMs are used Responsibly in Concrete ?

1. Specify that CSA A23.1-04 rather than earlier versions
 - ▶ Clause 8.8 has requirements for High Volume Supplementary Cementing Material concrete
 - ▶ Removes the confusing, split responsibility common specifying option
 - ▶ References the latest A3000-03 Cementitious Materials Compendium

How Can an Owner Ensure that SCMs are used Responsibly in Concrete ?

2. Involve the parties with the expertise to ensure success in the decision making process
 - ▶ Owner, Supplier, Designer, and Contractor all need to have their requirements met

Integrated Design Process (IDP)

- An Integrated Design Process is when all parties involved work together from the earliest stages
 - ▶ An IDP enables many changes to be made that would otherwise be impossible
- Designing and building the most cost effective, "state of the art" structures can only be achieved through an Integrated Design Process, such as,
 - ▶ HVSCM
 - ▶ Thermal Mass design
 - ▶ Down sizing of mechanicals based on improved energy efficiency
- **LEED Silver and higher can be lower cost than normal construction when you use IDP.**

Why use IDP?

- When used correctly IDP can result in lower initial cost and lower long term cost and better building performance
- When all state of the art design opportunities are implemented and taken into account by all parties, significant initial cost savings and improved performance can be realized.



Green Building Certification Programs

- US LEED
 - ▶ Leadership in Energy Environmental Design - US Green Building Council
- BREEAM
 - ▶ Building Research Establishment Environmental Assessment Method
 - ▶ **15 - 20% of new office buildings in the UK are built using the BREEAM approach**
 - ▶ **There is dramatic growth in the number of LEED registered projects in North America**

Supplementary Cementing Materials

- You can get credit in the new Canadian LEED system for the use of SCMs, no matter how much you use.
- The **recycled content** credits 4.1 and 4.2 are based on the reduction in the amount of portland cement used, not on the actual % of SCMs used.
- Aside from the LEED credits, there are many reasons to use the "right" amount of SCMs in concrete.



York University Computer Science Building



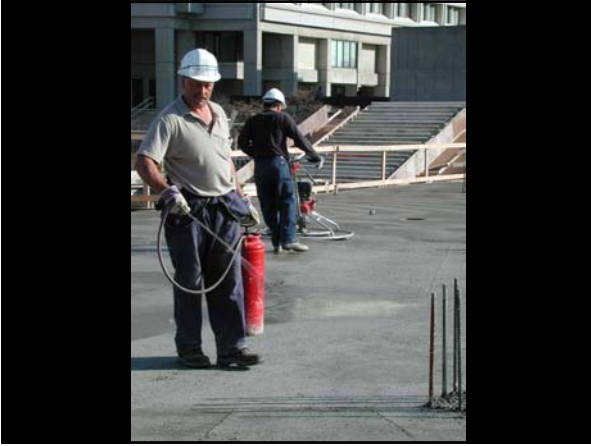
York University Green Building

- Energy-efficient building envelope
 - Natural illumination, ventilation and heating
 - Reduced resource consumption
 - Efficient land use
 - Reduced emissions
 - Use of recycled materials
- Estimated reduction of 85,000 tonnes of green house gases over the 75 year design life

50% Type CI Fly Ash Concrete

- 50% fly ash was used in the footings and interior columns, walls and slabs
 - Exterior concrete exposed to weathering used normal fly ash amounts
- 50% was arbitrarily selected - not based on an analysis of performance, durability or constructability of the concrete.
- Replacement rates could have optimized and perhaps increased in most components.
 - Replacement rates should probably have been reduced in the cold winter months.









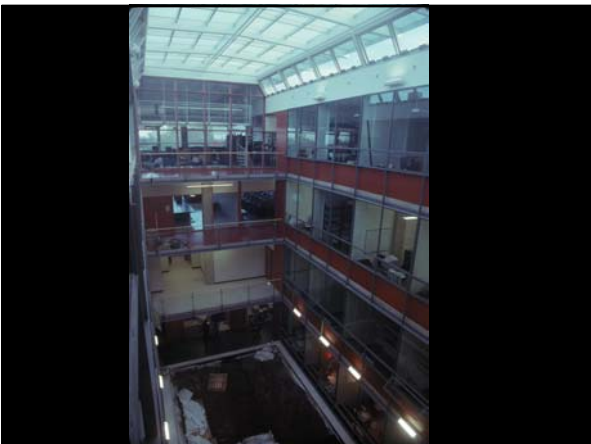




























Owners Point of View

- The best performing structures are built using "State of the Art"
 - ▶ Materials
 - ▶ Techniques
 - ▶ Processes



The "State of the Art"

- The "State of the Art" in concrete design is,
 - ▶ Mix designs, using the latest proven technology, that are optimized for
 - Performance
 - Cost
 - The best performance and cost can only be achieved through the optimized use of SCMs
 - ▶ Using a design process that lets mix performance and construction practices to be optimized.