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Webcast

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SR&ED cases – TECHNOLOGY
Beton Mobile – winning projects

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Beton Mobile – projects 2010-2012

Facts:

- Mobile concrete related technology
- 14 projects over 2010 to 2012 taxation years – 6 eligible

Company represented by:

- Jacques Bertrand, engineer 1967, President & founder
- Gérard Dubé, engineer

CRA represented by RTA's

- Cédric Durban, PhD Mech. Eng. 1997 (2010 projects)
- Karim Mimoune,– PhD Mech. Eng. 2002 (reviewed 2011 and 2012 projects)

Facts on Documentation

- [30]Mr. Dubé testified that date, time & brief description of tests noted in **notebook**,
- notes **not necessarily understandable** for another civil engineer,
- but he is able to understand them and consult his computer files to determine what was done in a project.

Variables of uncertainty

[16] Concrete base inputs: cement, sand, stone & water.

Additional adjuvants

- entrained air, superplasticizers, colloidal agents and latex for better resistance or better durability.

[17] BMQ 300 concrete mixes, develops 15 to 20 per year. possible combinations

- six or seven cements,
- 100 types of stones,
- a very large number of types of sand,
- 500 to 1000 different additives,
- Dosages …

BENCHMARKING PRIOR ART

[21] Mr. Bertrand & company

- work with MTQ & universities,
- starting point for project includes **bibliographic research, discussions with colleagues, industry and university professors.**
- However, studies **do not consider**
  - Quebec, **winter durability** requirements &
  - **mobile concrete mixer**
- Factors form hypotheses to achieve characteristics in mixture

Key Criteria Summary

2010 - Beton Mobile - 14 concrete projects (6 WIN)		
OBJECTIVES		**RESULTS**
Durability:	x	
air:	x	
slump:	x	
temperature :	x	
density / compression):	x	
BENCHMARKS / PRIOR ARTS SEARCHS		
Internet searches: Articles		20
Patent searches: patents		2
Competitive products or processes: products		3
Similar prior in-house technologies: products / processes		1
Suppliers: products		3
Queries to experts: responses		4
Other: (specify)		
UNCERTAINTIES & KEY VARIABLES		**CONCLUSIONS**
#1-additives (>1,000)		
#1-cement type (7 main types)		
#1-sand types		
#1-stone types (>100)		

Issue(s):

- Evidence of advancement & systematic investigation – examine 6 projects with focus on largest 3 (next slide)

Relevant legislation and analysis:

- ITA 37 & 248(1) – all projects

6 successful projects – focus on largest 3

Project	Employee Wages	Subcontractor Costs	Material Costs	
Number / Name				**Total**
10-18: Develop a light self-compacting mortar for mobile concrete mixer	3,521.00	360.00	427.00	4,308.00
11-04: Analysis of the influence of binders and additives on the performance of self-placing concrete	34,689.00	3,425.00	2,126.00	40,240.00
11-07: Developing an ultra-fast setting mortar for installation in a marine environment	2,979.00	0.00	394.00	3,373.00
12-01: Development of fast-setting latex-free concrete	18,968.00	3,128.00	1,964.00	24,060.00
12-03: Development of quick-setting latex concrete screed	14,496.00	4,159.00	1,975.00	20,630.00
12-07: Development of repair product for roller compacted concrete	10,728.00	1,917.00	494.00	13,139.00
	85,381.00	12,989.00	7,380.00	105,750.00

Beton Mobile – project 1104
Quick-setting self-compacting concrete

Facts:

- [261] Hydro Québec concrete repair slideways of floodgates
- important valves not move while concrete poured;
- concrete dry quickly without deforming slides.

Compressive strength (resistance of)	**Current**	**Objective**
10 megapascals - **HOURS >** installation	48	24
50 megapascals - **DAYS >** installation	28	7

CRA position for denial

Analysis

- [269] CRA Argued … “activities cannot be classified as SR&ED; it is **known** that the addition of **accelerator admixture** is used to **obtain better resistances more quickly.**
- In addition, no systematic research was carried out within the framework of this project, since BMQ used a method based on **trial and error** and the available knowledge.”

Experimentation

[262] visual tests setting time **standard concrete mixture ternary cement**.

- increase **setting accelerator =**
- faster setting but not compressive strengths
- **manufacturer Holcim**, changed **formulation ternary cement**

[263] tested **mixtures "HE" cement & general purpose cement**

- increase **dosage of cement** in mixture for compressive strength.

[264] opted for a **binary cement** not used ten years

- **replaced the superplasticizer** less effective, but
- **would delay setting less**, increasing resistance early stage

Ruling & Rationale WIN

- According to the judge;
  - “[271] Mr. Bertrand said: “We are aware **binders and adjuvants** ..subject studies”
  - However, **not documented …**is the **combination of all these components in the context of selfcompacting concrete and mobile concrete mixer** with its mixing energy.
  - Hence the presence of **technological uncertainties** related to the integration and combination of these elements. "

Ruling & Rationale WIN

According to the judge;

[273] "I do **not believe BMQ simply qualified products …**

On contrary, **created quick setting self compacting concrete**,

- that **did not exist** before.
- could not trust any current technical study

[274] Evidence **scientific method followed**

- Numerous tests by independent laboratories,

- numerous **laboratory reports** in evidence.

testimony of Mr. Dubé, demonstrated progress.

[275] … activities constitute SR&ED"

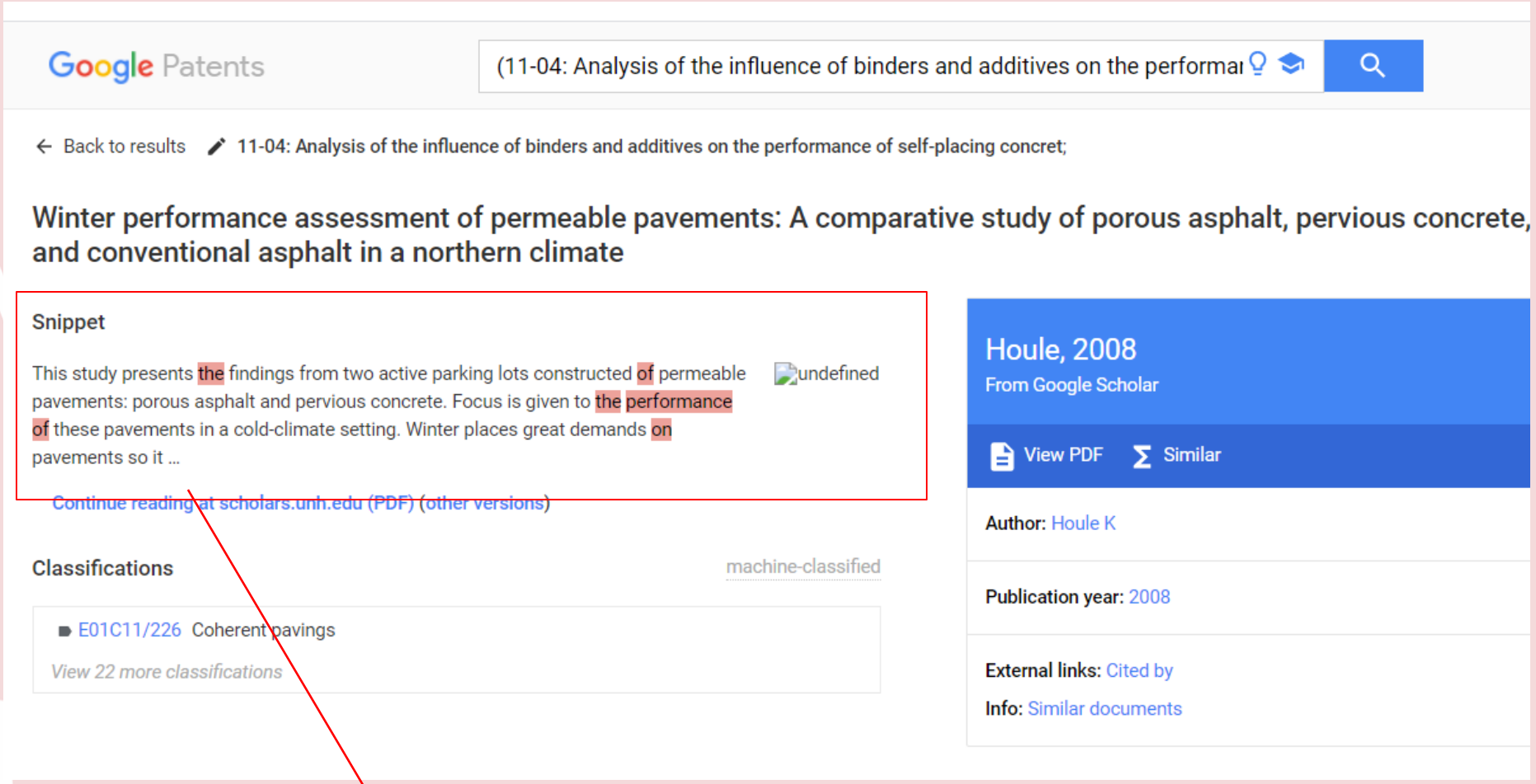
Key Criteria Summary

2012 - 11-04: Analysis of the influence of binders and additives on the performance of self-placing concret	
BENCHMARKS	**ACTIVITIES BY YEAR**
Internet searches: 5 Articles	2020
Competitive products or processes: 6 products	1-1
Suppliers: 5 products	Activity 1
OBJECTIVES	**RESULTS**
achieve 10 Megapascals: 24 hours	24
achieve 50 Megapascals: 7 days	10
UNCERTAINTIES & KEY VARIABLES	**CONCLUSIONS**
1 - Technological uncertainty	
adjuvants	Y
binders	Y
mixing energy of mobile mixer	Y
self compacting concrete effects	Y
	METHODS
Analysis	42
Trials	15
Prototypes	
Lines of code	
	COSTS
Hours	330.00
Materials $	2126.00
Subcontractor $	3425.00

Our comments:

Re. Inability to find prior art

- What is a “reasonable search?”
  - Sources
  - Search terms
  - Prior experience
  - …
  - Let’s explore - prior art search examples



Snippet
This study presents the findings from two active parking lots constructed of permeable pavements: porous asphalt and pervious concrete.
Focus is given to the performance of these pavements in a cold-climate setting.

Google Patents

quick setting self compacting concrete

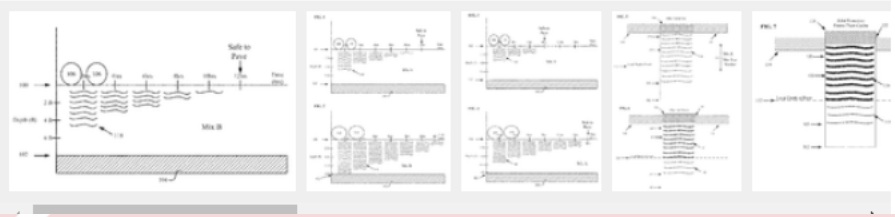
← Back to results quick setting self compacting concrete;

Foamed compositions for reducing freeze-thaw heave risk, and methods of utilizing and producing the same

Abstract

A composition and method for reducing freeze-thaw heave risk over flash-filled voids are disclosed. A composition can include cementitious fly ash, water and cellular foam. The composition can optionally include a filler, e.g., Type F fly ash, or additional desired components. A method can include mixing the desired composition and applying the composition to a void. The method can optionally include determining the desired composition based on various factors.

Images (16)



US8747547B1
United States

Download PDF Find Prior Art Similar

Inventor: Stanley R. Peters, Douglas Alex Hernandez, Darin R Duran, William S Caires, Brian P. Masloff, John Charles Fodor

Current Assignee : EAGLE STRONG INVESTMENTS, LLC , Flashfill Services Inc

Worldwide applications

2011 • US

Patent describes backfill material composition for preventing ice lens formation consisting essentially of:

- between 5% and 75% air by volume;
- between 20% and 90% class C fly ash by weight; and
- between 15% and 60% water by weight;
- wherein composition time to set < 40 minutes,
- compressive strength 100 PSI after 4 hours, and
- removability modulus of less than 1.8 after 28 days.

Our comments:

Re. Inability to find prior art

- What is a “reasonable search?”
  - more = better
  - no absolute rule
  - Similar objectives even though different methods may provide ideas & synergies –e.g. Use of underlay materials, etc.

12-01: Development of fast-setting latex-free concrete

Facts:

- [309] project started request from Transport Canada concrete for repair of taxiways at Montréal-Trudeau-Airport.
- [310] repairs required quick-setting concrete for traffic lanes operational quickly
- latex to be removed mixture
  - modified mixture allow rapid achievement of compressive strengths, durability &
  - certain flexural strength standards.

CRA position for denial

[319] CRA argued,

- "**purpose of project** to carry out an **emergency repair** with mixture approved before being installed.
- therefore a **commercial project** not an SR&ED activity.
- majority of steps taken **discussions with BMQ experts and partners**, … shows **information was accessible**.
- approach ordinary method and tests trial and error based on available knowledge and experience
- The **difficulties encountered are normal** and can be resolved by current practice in the field."

Experimentation

[312] Despite previous failures, found superplasticizing admixtures could improve setting concrete without latex.

- discussions led to formulation two mixtures, tested in lab, determine compression resistance at young age.

[318] enabled BMQ to study

- possibility using adjuvants in liquid form in a mobile concrete mixer, when solid inputs normally used in the mobile concrete mixer.

Ruling & Rationale -WIN

According to the judge; Qualification of the project

[320] Technological Uncertainty - not predict objectives met using usual procedures or current technical studies.

- objective to **develop a new product**:
- quick-setting concrete **without latex durable and efficient** as with latex.
- Find adjuvant reacts CSA cement instead of latex.
- **still trying to understand the interaction of adjuvants**
- **compatibility with quick-setting cement**,
- documentation on subject is almost non-existent.

[321] The technological progress … new knowledge on the

- **performance of certain superplasticizing adjuvants** in its mixtures.
- hypothesized certain superplasticizing additives give property as latex.

[325] Thus, for these reasons, the activities carried out by BMQ in the context of this project constitute SR&ED activities.

Key Criteria Summary

2014 - 12-01: Development of fast-setting latex-free concrete	
BENCHMARKS	**ACTIVITIES BY YEAR**
Internet searches: 4 Articles Similar prior in-house technologies: 2 products / processes	2020 1-1 Activity 1
OBJECTIVES	**RESULTS**
Chip resistance: x flexural strength: x methods to replace latex: % content	
UNCERTAINTIES & KEY VARIABLES	**CONCLUSIONS**
1 - Technological uncertainty	
adjuvants compatible with quick-setting cement	Y
limits of mobile mixer	Y
liquid vs powdered adjuvants	Y
	METHODS
Analysis Trials Prototypes Lines of code	2 7
	COSTS
Hours	180.00
Materials $	1964.00
Subcontractor $	3128.00

Our comments:
1) Commercial vs. Experimental

CRA argued,

- "**purpose of project** to carry out an **emergency repair** with mixture approved before being installed.
- therefore a **commercial project** not an SR&ED activity.

Issue(s)

- Does potential commercial value remove SR&ED eligibility?

Our opinion: Likely not: see cases of

  - Cultures LaFlamme,
  - Consoltex

Science vs. business issues should determine eligibility

Our comments:
2) Benchmarking existing methods

- Common theme of successful projects
- Valuable if courts provide further details in future cases?

12-03: Development of quick-setting latex concrete screed

Facts:

[371] large-scale tests of product previously developed.

- aim test behavior quick-setting latex concrete as rolling surface material vs. repair material.
- quick-setting latex concrete known …used in the industry as a repair material.
- study installation latex concrete slabs on existing concrete structures positive results in US
- no information available mixture comprising fast setting cement.
- American expert consultant confirmed, to his knowledge, latex concrete never installed on a suspension bridge

CRA position for denial

[370] According to CRA .. absence of technological uncertainty.

“project ultimately only led to diagnosis of problem that arose in context of an ordinary installation operation …

Difficulties encountered not due to mixture supplied, but manner of preparing surface which poured,...a technical problem …common practice.”

Experimentation

[359] 2011, first test board … mixture contained setting retarder more time for placement and finishing.

- air entraining admixture also added.

[360] Test on bridge over 20 meters. Results satisfactory except air bubble network of concrete, affected tightness & permeability chlorine ions.

[361] adjustment air entraining admixture to improve air bubble,

- slab cracked a few days.
- BMQ believed problems curing concrete & preparation surface poured
- samples also showed network of air bubbles unsatisfactory

[362] air entraining adjuvant adjusted 2nd time correct air bubbles new test undertaken another section of bridge.

- Both test boards removed within months of installation - poor adhesion to existing surface.
- According to Mr. Bertrand, thermal constraints of bridge generated this problem.

[366] Since large-scale trials unsuccessful, project abandoned

Ruling & Rationale -WIN

According to the judge; Qualification of the project

[375] evidence demonstrated **technological uncertainty** due to fact **quick-setting latex concrete** had **never** been used as a rolling surface material and uncertainty as to;

- **how the surface should be prepared** in order to promote concrete **adhesion**,
- as well as the concrete **curing method** to avoid **cracking**.

The solutions could not therefore be based solely on current practice.

[378] the activities … constitute SR&ED activities."

Key Criteria Summary

2015 - 12-03: Development of quick-setting latex concrete screed	
BENCHMARKS	**ACTIVITIES BY YEAR**
Internet searches: 1 Articles	2020
Similar prior in-house technologies: 1 products / processes	1-1
Queries to experts: 1 responses	Activity 1
OBJECTIVES	**RESULTS**
Durability: x Chlorine permeability: x adherance to existing surfaces: x	
UNCERTAINTIES & KEY VARIABLES	**CONCLUSIONS**
1 - Technological uncertainty	
air entraining admixture effects	Y
curing method to avoid cracks	Y
effects of setting retarder	Y
surface preparation for adhesion	Y
	METHODS
Analysis Trials Prototypes Lines of code	2
	COSTS
Hours	138.00
Materials $	1975.00
Subcontractor $	4159.00

Our comments:

Ideally conclusions would

- Attempt to explain results at a chemical level
- why incapable meeting thermal constraints