

KING MS SELF-CONSOLIDATING CONCRETE Making its Mark in the Province of Quebec.

The Olympic Stadium or better known as the "Big O" is a multi-purpose stadium in the Hochelaga-Maisonneuve district of Montreal, QC, Canada and was built for the main purpose of hosting the 1976 summer Olympics.

For the past several years, routine maintenance has been scheduled to the repair parts of the facility's concrete parking structure. This is usually completed during the winter months to avoid the busier summer periods when the stadium is in use. The Olympic Installations Board enlisted the services of Genivar, a consultant with years of concrete rehabilitation experience to investigate and determine the proper maintenance schedule for 2009.

Reports indicated that major repairs

to soffits, beams and columns were required to ensure long term, continued structural stability. The Olympic Installations Board awarded a contract to undertake the repairs to Tro-Chânes Inc., a well respected concrete restoration contractor with offices in Montreal, QC and Quebec City, QC.

Deteriorated concrete was removed where applicable and forms were installed to allow the replacement material to be pumped in place. Initial plans to utilize high slump ready mix concrete were revised after segregation of the coarse aggregate, caused in part by the long travel distance into the lower levels of the garage, made the ready-mix concrete impossible to pump. After the initial attempt, a demo using King MS Self-Consolidating Concrete was con-



ducted and the contractor was pleased to find that despite a high slump flow of 24 inches (625 mm), there was no bleeding or segregation and the MS Self-Consolidating Concrete pumped easily into the forms.

Site Superintendents, Stéphane Lemelin and Yolane Levasseur, from Tro-Chânes commented on the ease at which the MS Self-Consolidating Concrete could be pumped. "You just mix it, dump it in the hopper and start pumping", he said. "We will definitely be using this product again on other projects".



Kevin Robertson
Technical Sales Representative

Technical Advances

The Use of Macro-Synthetic Fibres in Dry-Mix Shotcrete

The use of monofilament macro-synthetic fibres in wet-mix shotcrete applications has grown significantly worldwide since their introduction

in the late 90's. Unlike steel fibres, which must be used at relatively short lengths (30 mm) to prevent hose blockage, the more flexible

macro-synthetic fibres can typically be used, in well proportioned wet-mix shotcrete mixtures, at lengths ranging from 50 to 100 mm, without significantly reducing the pumpability and shootability of the mixture.

A modified version of the same macro-synthetic fibres is now available for use with dry-mix shotcrete. At the shotcrete production stage, the new fibre design has

provided improved homogeneity of the fibres, which eliminates conduit blockage of the batching dispensing unit. At the shooting stage, it has provided reduced fibre rebound and consequently, increased in-situ shotcrete flexural performance.

The 40 mm long, 650 MPa (95000 psi) tensile strength monofilament self-fibrillating macro-synthetic fibre is composed of a polymer blend that partially

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Message from Joe Hutter
Vice President Sales



Jobsite Technical Challenge

King Construction Products Group

Volunteering... An Investment in our Industry

There are hundreds of trade organizations representing many different aspects of the construction industry. One thing that they all have in common is the fact that these organizations can only exist with the help of the many volunteers that come from the manufacturers, distributors, contractors, engineering firms and others, that make up the industry.

King Packaged Materials Company has long recognized the importance of supporting these organizations and if you look up and down the list of committee chairs, directors and executives for the groups representing our industry, you will be sure to find the names of many King personnel who have volunteered to take a prominent role.

There is no better way to help your industry and your business grow than to get involved. So next time you attend a convention, conference or committee meeting, introduce yourself to the organizer and offer to help. You may find that their day job is spent working at King!



Photo credits : Simard-Beaudry Construction inc.

MS Cable Grout Performs in Extreme Conditions

THE OLD LAVAL/PATON ISLAND IS BACK IN SERVICE DESPITE
THE FRIGID 2009 WINTER CONSTRUCTION SEASON.

There are only 2 bridges to get on and off Paton Island near the City of Montreal. In the fall of 2009 a structural evaluation by engineers concluded that the older of the two bridges would need to be closed to traffic until a replacement strategy could be implemented. The volume of traffic using the old bridge made it necessary for The City of Laval to have a new bridge completed as quickly as possible so a contract was awarded to Simard et Beaudry Inc of Montreal who began construction during the winter of 2009. The new bridge design required that grouted rock anchors be installed through the old bridge deck, 10 meters (35 ft) in the water to the riverbed. Average temperatures in the Montreal area of -15°C, during construction

created significant challenges for the construction crews, especially for the grouting sub-contractor Cimota Inc. of Québec City. Temperatures were so cold that continuous ice formation on the shaft of the drill rig, forced the crews to frequently stop the drilling process so that they could break and melt the ice build-up.

Divers were required to guide the 20 meter (66 ft) long anchors through the frigid water of the river into the holes in the riverbed. King MS Cable Grout was then pumped, using tremie techniques, with 30 meters (100 ft) of head pressure under the water, through the grout hose which also had to be placed by divers into the bottom of the grout holes. During the grouting process,

the MS Cable Grout displaced any cold water from the bottom to the top of the hole. Cimota grouting crews took the extra precaution to heat the MS Cable Grout to 20°C to maintain the required set time in such cold conditions.

The King MS Cable Grout performed as expected under extremely difficult jobsite conditions. The material pumped very easily, it provided excellent resistance to water washout (without the use of additional admixtures) and reached the specified hardened properties within the required time constraints.

Simon Reny, Eng.
Manager Technical Services

The Masonry Corner



The Minequip Column

Moisson Montreal Foodbank. A Community Partnership.

Moisson Montreal, located in Montreal, QC is Canada's largest foodbank. A project undertaken by CEDC a Montreal group specializing in the development of sustainable building practices, was given the mandate to give the facility a much needed upgrade. Their objective was to dramatically reduce operating costs by improving the building's energy efficiency through improved design and the use of sustainable construction materials and methods.

With an estimated budget of \$4 million, the project would be entirely financed by the generosity of contractors, manufactures, distributors and construction industry professionals who donated their time, money and materials to the project. King Packaged Materials Company was given the task of providing all masonry mortar and grout used in the building envelope.

Upon completion, over 30 tonnes of King 1-1-6 mortar, Type S Block

Mortar and Expansive Masonry Grout were donated by King to help with the completion of this important community project. Today, nearly 110,000 people annually are aided by the efforts of those who run Moisson Montreal. King was proud to be a part of this project.

Clementina Dumitrescu
Technical Representative
Masonry Division

CONCRETE RE-MIXER'S ALLOW FLEXIBILITY OF WET OR DRY CEMENTITIOUS MATERIALS

Concrete for Xstrata Copper's Kidd Creek Mine must travel a rather lengthy distance from surface, through several stages of slickline to a point 3000 meters (9500 ft) underground to "the deep", where construction crews are placing concrete. Before any of the concrete is placed however, a re-mixing process is required to compensate for any segregation of the material.

Technical staff from King's Minequip Division presented the Kidd Creek engineering staff with a unique solution to the segregation problem in the form of a Maxon Maxcrete Re-mix Surge Hopper. This skid mounted, electric/hydraulic unit is compact, cageable and easily transported underground so that it can be moved from one level to another and utilized throughout the mine. The "Maxcrete" is powered by a single, 600V power supply and is certified to meet the minimum ASTM and ACI requirements for re-mixing concrete.

In addition to re-mixing capabilities, The Maxcrete offers the added capability of batching pre-blended, packaged concrete mixes when the slickline is in use or when conventional concrete mixes from surface are not available.

With a little help from the Minequip technical staff, the Kidd Creek construction crews have been using the Maxcrete Surge Hopper for over 6 months. It has proven to be a versatile concrete mixing plant.

Craig McDonald
Sales Manager Mining Markets

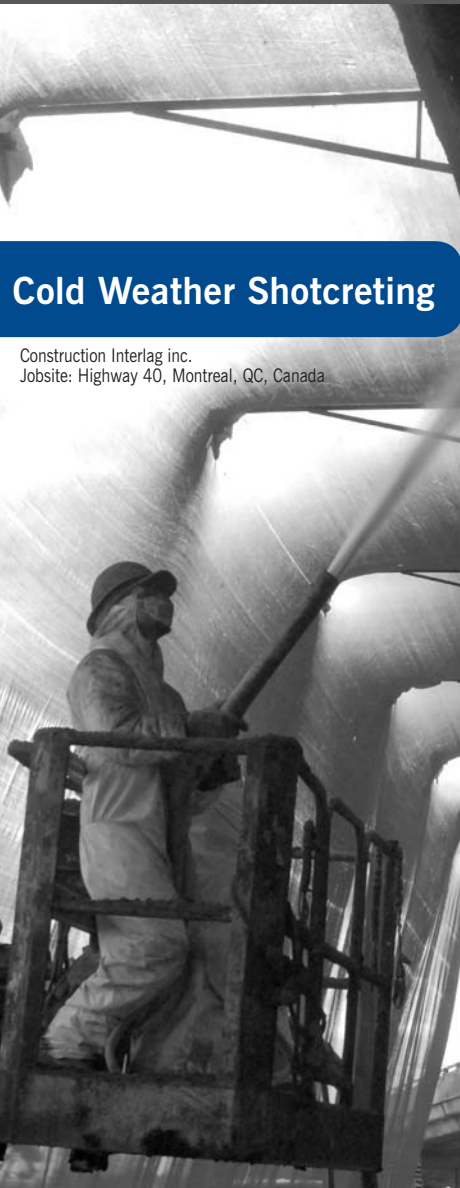
When Temperatures Start to Fall... To Shoot or Not to Shoot? That is the Question!

It's the time of year when the question of cold temperature application becomes a common one for North American shotcrete crews. The answer to this question can be somewhat complicated and must be precluded with "how cold is cold?". A conventional shotcrete mix can be placed if minimum ambient temperatures are 5°C (40°F) and rising but should be discontinued if the temperature is expected to fall below 5°C (40°F). Insitu shotcrete must then be cured and protected from freezing until it reaches a compressive strength of at least 3.5 MPa (500 psi). At this strength, the shotcrete microstructure will be strong enough to withstand the damaging effect of freezing. If freezing occurs before it reaches such strength, the hardened properties such as compressive strength and durability will never reach their intended design. To avoid freezing, it is good practice to maintain the material temperature above 10°C (50°F)

and the mixing water temperature between 20°-25°C (70°-80°F). After placement, the temperature of the insitu shotcrete should be maintained above 5°C/40°F for a minimum period of 24 hours.

Special shotcrete mix designs such as King MS-D3 Accelerated Shotcrete, can be used at lower temperatures [between 0°C (20°F) and 5°C (40°F)], but these mixes must also be cured and protected from freezing before reaching the critical minimum required strength of 3.5 MPa (500 psi). It is also important to avoid wet curing when temperatures are expected to fall below 5°C (40°F). Use a resin based liquid membrane curing compound approved for use in cold temperatures. Finally and most importantly, NEVER apply shotcrete to frozen concrete surfaces!

Jean-François Dufour
M.Sc.Eng., P.Eng.
Technical Director



Cold Weather Shotcreting

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The Shotcrete Section

Les Grands Travaux Soter inc. (G.T.S.)
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Bonding Agents for Shotcrete - Required or not Required?

As I travel across the country, I am continually asked about the use of bonding agents with shotcrete...

The first and probably most important step in achieving good bond is surface preparation. Removal of deteriorated concrete to sound substrate and a clean and saturated-surface dry (SSD) receiving surface are essential for providing durable repairs, regardless of whether the placement method is shotcrete or not.

The shotcrete process typically provides bond strengths in excess of 1.5 MPa (200 psi), even greater when using silica fume. Compaction of materials at the substrate is truly what helps shotcrete separate itself from many other concrete repair methods. The process drives concrete at the substrate in excess of 400 kph (250 mph), initially rebounding both fine and coarse aggregate until the paste has built to a sufficient thickness to allow proper embedment. The end result is the perfect bonding agent, a dense, low water/cementing materials ratio paste at the interface between the parent and repair shotcrete/concrete layers.

The goal in providing long lasting repairs should be to produce a composite section of compatible materials acting as a monolithic section of concrete. The shotcrete

process provides this without the added cost and/or potential downfalls of additional bonding agents. They are simply not required!

Scott Rand
Manager,
US Sales and Market Development

ANNOUNCEMENTS



Martin Bissonnette
TECHNICAL SALES REPRESENTATIVE

King Packaged Materials Company is pleased to announce the appointment of Martin Bissonnette to the position of Technical Sales Representative, Masonry Products Group. Martin will be responsible for the promotion of our full line of pre-packaged masonry products to the architectural and contracting communities in the area north of Montreal. He will be located in our Blainville, QC office.



Myriam Chevalier
SALES AND MARKETING COORDINATOR

King Packaged Materials Company is pleased to announce the appointment of Myriam Chevalier to the position of Sales and Marketing Coordinator, Construction Products Group. Myriam will be responsible for the inside sales and order desk functions for our Masonry and Construction Products for the markets served by our Blainville, QC production facility.

Technical Advances cont'd

fibrillates during mixing to increase its bond with the surrounding cementitious matrix. This characteristic improves the flexural performance of the shotcrete. The dosage rate of the synthetic fibre for dry-mix shotcrete applications is normally 6.9 kg/m³ (11.6 lbs/yd³) or approximately 0.767% by volume. This dosage provides equivalent flexural toughness performance to a steel fiber dosage of 55 kg/m³ (90 lbs/yd³) or welded wire mesh when used with dry-mix shotcrete.

The new 40 mm long self-fibrillating monofilament macro-synthetic fibres are now being used successfully by the Canadian mining industry for underground support applications in the Abitibi area, QC and Sudbury, ON, Canada.

Jean-François Dufour
M.Sc.Eng., P.Eng.
Technical Director



ASTM C1550
Panel Section at Failure—
Macro-Synthetic Fibre

