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Design  
Group

## Going green

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**Rempel Bros. Concrete Ltd.**'s green-and-white trucks are a familiar site in the British Columbian lower mainland area of North Vancouver, on the edge of the Pacific Ocean. Regularly delivering more than 150 orders per day to over 100 job sites, the company is committed to strengthening its focus on operations by building and growing its market share and implementing best practices. A new, fully enclosed, state-of-the-art ready mixed plant is part of that commitment.

More than a corporate color for Rempel Bros., green represents a willing adherence to sustainable design and the implementation of extremely strict environmental management guidelines set by the company, as well as various levels of government. The novel solution Rempel Bros. (a subsidiary of Allentown, Pa.-based **Lehigh Cement Co.**, which in turn, is fully owned by Germany's **HeidelbergCement Group**) has brought to reality is a fully enclosed 16,000-sq.-ft., central mixed plant.

The plant recently won First Place in National Ready Mixed Concrete Association's 2004 Commitment to Environmental Excellence Award, Category B. This award category is for plants with annual production of 50,000-100,000 yd. Rempel also was honored with the 2nd annual NRMCA Special Recognition Award, Producer Category, 2004 Environmental Innovation Award, for its concrete collection system for pump washout at the North Vancouver plant. Both awards were announced in early January 2004, and will be presented to the company during a March 9 awards breakfast at the NRMCA Annual Convention in Orlando.

### KEEPING A LOW PROFILE

From the exterior, the high-volume facility looks like a low-profile warehouse and is a welcome neighbor in an environmentally sensitive location on Vancouver's Burrard Inlet. A challenging requirement was that the plant had to be designed to meet municipal building height restrictions of 46 feet. This meant the operational equipment had to be specially designed for a low-profile stance — setting a new standard for ready mixed plants. Key components of the North Vancouver plant include a 5.25-yd.-capacity Simem “0 Gravity Zone” twin-shaft mixer, a Solomon liquid-color system for producing colored concrete, and a Simem concrete reclaiming system to recycle returned concrete.

“To establish our seventh plant in a location that makes good business sense, we had to consider the nearby residential community as well as the municipality's efforts to revitalize the oceanside industrial area of the inlet”. Our low-profile and environmentally friendly design allowed us to

meet both our business objectives for high volume and fit into the area plan,” explains Bob Fairbank, Rempel's vice president and general manager. “Our neighbors include a chemical plant; a bird sanctuary; Burrard Inlet, with provisions for public pathways and access to the ocean immediately next to the plant; and, adjacent properties zoned for mixed commercial use. Our team worked diligently to ensure that the plant was a fit for the unique setting, and we are proud of our ability to achieve this.”

With Operations Manager Doug Blender at the helm of construction, the new plant was completed in 10 months from turn of the first spade to start-up. With two Rempel plant construction projects under his belt, Blender was a driving force behind the creative solutions and smooth start-up at the new facility. The batch plant designed by Innoquip Systems Ltd. of Langley, B.C., was fabricated by Quadra Control & Weigh Systems of Surrey, B.C.

The batch plant runs on Command Alkon controls and has a 170-yd./hour capacity. Networked computer technology enables centralized order taking and dispatching to occur at the head office 50 miles away in Langley. The Simem 5.25-yd., high-speed, horizontal twin-shaft mixer can batch 14.25 yd. in less than five minutes. The twin-shaft method ensures fast, high-intensity, uniform mixing of raw materials and is flexible enough to produce any kind of concrete — from low-strength fill to high-performance concrete — and can handle aggregates as large as 8 in.

Each of two loading bays has been designed with a 5.25-yd. holding hopper above each bay. Working in synchronization, the first batch can be discharged from the holding hopper into the truck, while the second batch is mixing and the third is being weighed. While the driver is rinsing off his charge hopper and fins, a second truck can be loading in the adjacent bay. Mixing and loading can occur simultaneously under the protective cover of the building, maximizing output capacity.

Air quality management for dust and emissions includes a truck-exhaust recovery system inside the building that ensures a constant clean air supply for workers and drivers.

A significant number of electrical components adds to the complexity of the design features. Wiring requirements included three aggregate and two powder weigh-up hoppers, two water scales, a dedicated pressure washer and dust-collection system for the mixer, the liquid color system, the reclaimer and slurry handling system, and overall electrical for the 16,000-sq.-ft. enclosure.

Management of solids and water is assisted by a catwalk design atop each loading bay where drivers can rinse off their charge hopper and fins, while the truck is still in the interior bay. The catwalk can be pivoted manually out of the way to allow a Bobcat to access the wastewater catchment pond behind the loading bay. Wastewater is collected and fed through the reclaimer system for recycling. With no time-consuming wash-down racks to deal with, a driver can leave the loading bay and head directly to the job site.

## **COLORFUL OFFERINGS**

Adding to product diversity for customers, color flexibility can be offered without the need to purchase specific color pigment for every job. A palate of hundreds of colors of concrete can be produced with the Solomon liquid color system that consists of four, 250-gal. primary color storage tanks. With automated pigment metering, the system provides consistency in color quality between batches and reduces batch errors. Physical demands on mixer drivers, required to lift bags of pigment, are eliminated with the automated liquid system. The color is

automatically weighed up and delivered directly to the truck. Rempel has adopted the system following the experience of its sister operation in southern California, Standard Concrete, which was a pilot user of the Solomon dispensing equipment.

Many plant design features maximize worker ergonomics and safety. “In a few short months, our labor and material costs related to handling bagged color have been reduced, employee injuries are less likely to occur, and the plant stays a lot cleaner, due to the system,” says Doug Blender.

An added advantage of the color system is the inventory control and record-keeping capability. Dead inventory is eliminated, and there is always an accurate record of the color formulas batched, as well as an up-to-date inventory of each of the four primary pigments.

Waste materials management is a key to the plant's environmental efficiency. Wasted product is virtually eliminated by the reclaimer system that recovers cementitious materials, aggregates and sand, and water. Two mixer trucks can return concrete to the reclaimer at the same time. The reclaimer system separates coarse aggregate from the sand with an aggregate vibrating screen deck, and a take-away aggregate conveyor. The clean aggregates are used again to make fresh concrete. The system works in a loop whereby liquid material (slurry) is collected from the reclaimer into the first of four above-ground tanks with a total capacity of 37,000 gal.

The slurry is chemically treated in the first tank to stop the hydration process. The slurry is then moved daily from the first tank through to the fourth tank, where it can then be incorporated into fresh concrete — instead of city water — at a rate of anywhere from 0 to 100 percent, depending on the intended use of the concrete.

During its storage in the tanks, both the density and hydration stabilization are continually monitored. A separate system circulates hot water around the outside of the last two tanks during the winter season. The slurry in the last two insulated tanks is kept at a temperature of at least 150°F. A PLC system automatically controls the density of the slurry in accordance with Rempel's quality control specifications, to ensure consistency of the slurry from batch to batch. Fresh water is heated by two, 1.8 MM Btu hot-water heaters and stored in a 535-gal. hot-water storage tank for batching concrete in the winter.

With resourcefulness at the forefront of each design feature, yet another system allows a concrete pump to discharge its hopper into a hydraulically operated pan. If the dumped concrete is suitable for making an Octa Bloc, the pan has been designed to dump directly into an Octa Bloc form; or it can be discharged directly into the reclaimer hopper.

All wastewater generated throughout the building is managed by a series of covered drainage channels and concrete-lined ponds that collect the water and move it to four catchment ponds that settle out the solids. The clarified water overflows into catch basins where it is pumped to a series of three concrete-lined ponds outside the walls of the building, but still under its roof. The water is further clarified as it travels through these series of ponds. The water in the third pond is treated with a short-term stabilizing admixture and reused in the first slurry tank as mixer-truck drum-rinse water when discharging into the reclaimer. The solids collected in the catchment ponds, both inside and outside the building, are removed by a Bobcat and put through the reclaimer.

“The system reclaims three reusable products and reduces the waste by approximately 95 percent,” explains Blender. “From an environmental management perspective, the industry has come a long way in a short period of time, and the development of recycling solutions have been

an exciting advancement to incorporate into our plants. We are proud to have developed with our admixture supplier a slurry stabilization system that allows us to recycle our returned concrete and reuse 100 percent of the slurry and aggregates to produce fresh concrete.”

## SHIPPING OUT

Storage capacity of raw materials for the plant also includes twin 110-ton cement silos, twin 77-ton fly ash silos, and seven independent aggregate bins capable of holding 360 tons. All of the silos and aggregate bins have been constructed with a very low-profile design. The silos utilize WAM cartridge-style dust collectors to ensure a dust-free environment inside the building when unloading cement and fly ash bulkers. Siemens Milltronics microwave level sensors are utilized in the cement and fly ash silos to measure the volume of material in each of the silos. The cement and fly ash are conveyed to the weigh-up hoppers by 12-in.-diameter WAM screws.

Aggregates are trucked to the plant site and stored in outside concrete block bins. They are fed into the plant with a Cat 966B loader through a feed hopper onto a 36-in.-wide inclined conveyor, which feeds a shuttle conveyor located on top of the aggregate storage bins. The entire batch plant including reclaimer is fully contained in a 16,000-sq.-ft., pre-engineered, insulated steel building. An office, lunchroom, change room and storage areas are accommodated in a two-story concrete block building, complete with its own HVAC and sprinkler system, located entirely inside the steel plant building.

To enhance community relations, protecting neighbors from unwanted noise is a high priority. Blowers are located inside the building to off-load cement and fly ash bulkers. This reduces noise levels as the trucks can turn off their engines and blowers while unloading. In addition, an Octa-Bloc wall was installed on one side of the property to deflect sound. (A standard size Octa-Bloc is a large, rectangular concrete block 5 ft. long and 30 in. deep and tall, with beveled tops to create a finished, tapered edge for retaining walls. An octagon-shaped design permits interlocking.)

Octa-Bloc production is yet another environmental practice of Rempel Bros. operations. Leftover product does not go to waste; it has been developed into a revenue-generating opportunity. The North Vancouver plant (along with Rempel's other six plants) produces and sells Octa-Bloc from ready-mixed concrete that comes back to the plant from over-ordered jobs or as leftovers in pump hoppers. (Rempel's wholly owned pumping company, **Challenge Concrete Pumping Ltd.** operates a fleet of 13 concrete pumps ranging in size from 26 to 42 meters).

Even the 800-ft.-long concrete driveway leading into the plant is environmentally sensitive, incorporating a 3.3-ft.-wide pervious concrete strip along the edge of the roadway to drain away rainwater into the surrounding permeable soil. This allows surface drainage off of the roadway without impacting the municipal storm water system.

Company Vice President and General Manager Bob Fairbank says, “Each day, we operate by the vision statement of our parent company, **Lehigh Cement Ltd.**: ‘Working Together to Build our Communities.’ Our operations have changed over time, and we are prepared to implement technology and management practices that enhance our ability to exercise environmental responsibility throughout our business and the communities we work in.”

In British Columbia, Rempel Bros. North Vancouver plant is an important link in the company's delivery system to supply its customers with on-time, high-quality, ready mixed concrete to North and West Vancouver, Vancouver and Burnaby.