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Understanding Tier 4

We explain what the introduction of Tier 4 interim and Tier 4 Final emissions technologies will mean for your business’ bottom line.
The Next Generation

Shining a light on the next leaders of our industry.

From coast to coast the same message gets repeated everywhere this magazine has taken us: we are having a hard time finding young people for our operation. Sometimes the reasons for the shortage change, from competition with mining and the oilsands to a complete lack of young people pursuing the trades. But the end result is still the same: the next generation is not there to be hired.

Our magazine has been in constant discussions for the 18 months I have been here, looking for something we could do to help the situation. We have considered seminars, presentations at schools, targeted distribution and a raft of other ideas to try to do our part to push this industry to young people. But rather than keep looking for opportunities to spread the word outside of our industry, we realized that, perhaps, we need to look inside.

After nine months of meetings, nominations, deliberations and evaluations, we have selected 20 individuals to recognize as part of our inaugural Rock to Road Top 20 Under 40. The 20 finalists represent five provinces and one territory. And while an optimal list may have included at least one person from every single province and territory, the 20 people recognized are all deserving of this acclaim. They range from the entrance level to the top of the corporate structure with all aspects of the day-to-day operations of the aggregates and roadbuilding industry represented. It truly is a list to be proud of.

Recognizing the efforts of workers and companies in this way has become more commonplace in recent years, but for good reason. These lists recognize the efforts of those who deserve to have a spotlight shone on them. They provide examples for others to follow and remind us of the great things that can be accomplished by the youngest within our ranks. They also provide operations with new ideas and new strategies for taking positive steps toward employee retention, better business practices and greater profits.

We sometimes forget that the best advocates for the industry are the people in the industry. We have to look to the young generation that is already amongst us and make sure they enjoy what they are doing. Their word of mouth will spread throughout the social gatherings they attend and on a plethora of social media channels, communicating their enjoyment of our industry to the ears and eyes of those looking for a career opportunity that is right for them. The rock to road industry can be that career opportunity.

Please take the time to look through our inaugural Rock to Road Top 20 Under 40 and read about the accomplishments of the youngest generation of our industry. If there is someone you think should be recognized on the list, don’t worry, you’ll have your chance to single them out. We will follow up this year’s list with an additional 10 names, which we will present at this time next year. Stay tuned to Rock to Road magazine for the call for nominations in the next year.

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Milwaukee, Wis. – U.S. construction machinery exports dropped 21 per cent during the first half of 2013, with $10.8 billion shipped to global markets compared to $13.7 billion at midyear 2012, according to a recent report by the Association of Equipment Manufacturers (AEM). The AEM off-road equipment manufacturing trade group consolidates U.S. Commerce Department data with other sources into global trend reports for members.

Nearly all world regions recorded double-digit declines, except Central America with a double-digit gain.

Construction equipment exports for the first half of 2013, compared with midyear 2012, are as follows:

- Exports to Europe declined 20 per cent for a total $1.4 billion, and exports to Canada dropped 15 per cent for a total $3.7 billion.
- Exports to Asia decreased 24 per cent to $1.2 billion.
- Exports to Central America gained 15 per cent to $1.2 billion, with exports to South America dropping 13 per cent to $1.9 billion.
- Australia/Oceania’s export purchases decreased 62 per cent to $750 million, while Africa took delivery of $654-million worth of construction equipment, a 20 per cent drop.

The top countries buying the most U.S.-made construction machinery during the first half of 2013 were as follows: (1) Canada – $3.7 billion, down 15 per cent; (2) Mexico – $1 billion, up 18 per cent; (3) Australia – $715 million, down 63 per cent; (4) Brazil – $513 million, up 17 per cent; (5) Chile – $475 million, down 38 per cent; (6) Colombia – $333 million, up 13 per cent; (7) Belgium – $330 million, down 18 per cent; (8) Peru – $329 million, down nine per cent; (9) South Africa – $316 million, down 36 per cent; (10) Russia – $269 million, down 34 per cent; (11) China – $243 million, down 38 per cent.

The Newfoundland and Labrador government has awarded two contracts totalling more than $38 million as work gets underway to prepare for paving of Phases II and III of the Trans Labrador Highway (TLH).

Two project contracts recently awarded to Mike Kelly & Sons Ltd. include widening and upgrading of 80 kilometres on Route 510 from Red Bay to Lodge Bay with a contract value of $22.5 million; and widening and upgrading of 80 kilometres on Route 510 from Happy Valley-Goose Bay towards Cartwright with a contract value of $15.7 million.

“This highway is one of the largest infrastructure projects in our province’s history,” said Minister Responsible for Labrador Affairs Nick McGrath. “Spanning close to 1,200 kilometres and navigating some of the most remote land in our country, the TLH represents immense investment and provincial pride.”

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For Rock to Road magazine is circulated free of charge to qualified individuals holding management and supervisory positions with companies engaged in the aggregate, roadbuilding, ready-mix concrete and asphalt production industry in Canada. The Publisher reserves the right to determine qualification.

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Introducing the new QJ341
Raising the standard

Utilising Sandvik’s unrivalled design and manufacturing expertise the QJ341 builds upon the success of the QJ340 but has now been constructed with many innovative design changes for greater performance, improved accessibility and ease of operation. Powered by a 261 kW (350 hp) emissions-compliant CAT engine, the upgraded model now includes many advanced features as standard. Some of these include a full colour PLC screen for easy automated control; a jaw level sensor to control the feed rate and maximise production; a speed wheel on the main conveyor and a new hydraulic system to provide improved system control for increased crushing efficiency. These new features are aimed at ensuring the QJ341 is now as user and environmentally focused as it is productive, fuel-efficient and versatile and will become the jaw crusher of choice within the aggregate and construction industries.
By now, industries that use heavy equipment are somewhat familiar with Tier 4 standards and their associated new technology. The standards were introduced—in a tiered fashion—in 1996 by the U.S. government in order to reduce the harmful exhaust gases and particulate matter coming from heavy equipment engines. Manufacturers currently have to meet “Tier 4 Interim” standards for some horsepower ranges, and companies are required to meet “Tier 4 Final” by Jan. 1, 2014 for equipment larger than 175 horsepower. For equipment between 75 to 175 horsepower, it’s Jan. 1, 2015.

Before we look at which after-treatment exhaust treatment technologies are being used by major road-building equipment manufacturers, let’s take a look at the two main types of tech, how they differ, and what they involve in terms of ongoing operation, maintenance and fuel efficiency.

All manufacturers are all using variations of the same two technology options to meet current regulations, and these may be combined in some form for Tier 4 Final by various companies:

- **Cooled Exhaust Gas Recirculation (CEGR)** recirculates exhaust gases into the combustion chamber to reduce the formation of nitrogen oxides. To transform and/or reduce the particulate matter that results from the lower combustion temperatures of this system, a Diesel Oxidation Catalyst (DOC) and Diesel Particulate Filter (DPF) are utilized.

- **Selective Catalytic Reduction (SCR)** involves treating exhaust gases with an ammonia-and-water-based substance known as Diesel Exhaust Fluid (DEF). When the exhaust passes over...
the SCR catalyst in the presence of DEF, nitrogen oxides are broken down into harmless nitrogen and water.

“In most cases, the size and operational mode of the equipment designates which technology is applied and is most cost-effective,” notes Aaron Kleingartner, Doosan segment application marketing manager. CEGR is suited to machines that operate at steady engine RPMs, like a crawler excavator, where consistent exhaust temperatures aid in the reduction of particulate matter in the DPF.

CASE Solutions marketing manager Brad Stemper adds that SCR technology on most traditional skid steers (which run at steady engine speeds), for example, would have a greater impact on the overall cost of the machine due to their lower purchase price. He says “A DOC-only solution is a match for skid steer models that are commonly used by contractors with large fleets, as well as rental fleets. In these applications, the machines may have various operators and move around between job sites regularly. Using the maintenance-free DOC-only solution for these models creates greater convenience and more efficient operation compared to CEGR with DPF, or even SCR to meet emissions within this horsepower range.”

“However, for the typical wheel loader that performs tasks that result in varied engine RPMs and power demands, SCR is better,” says Kleingartner. Stemper adds, “SCR enables the wheel loader’s engine to run at peak performance while regulating emissions. The result is full power at all times but with less fuel consumption, which translates into more value for these particular machines.”

**OPERATION AND MAINTENANCE**

In general, no operator intervention or interruption is required to manage Tier 4 emissions system technology. “Tier 4 technologies do not add complexity to the operation of construction equipment,” Stemper says. “Users have found it easy to check DEF levels on SCR-equipped machines, as well as the DPF on machines with CEGR technology.”

SCR systems are maintenance-free, except that the DEF filter must be checked and the DEF tank must be refilled on a regular basis. With CEGR, three types of regeneration of the DPF occur automatically without operator intervention to reduce accumulated particulate matter to ash. Passive regeneration occurs on an ongoing basis. Active regeneration incinerates particulates automatically at high temperatures based on pressure sensors that indicate how much accumulated PM is in the DPF. “Every manufacturer has a different time limit that requires an active regeneration,” Kleingartner explains. “Most do not have an exact hour limit, but conduct the active regeneration (which involved injecting diesel fuel into the exhaust to increase the exhaust temperature) only when the machine requires it.” Forced regeneration requires the machine to sit idle while the engine control unit conducts a high temperature exhaust cycle to regenerate the DPF.

The only CEGR maintenance required is cleaning ash out of the DPF, but regulations require that the filters must last at least 4500 hours before this needs to occur. Kleingartner adds, “The engine oil used should be a ‘low ash’ oil with a CJ-4 rating.”

Fuel efficiency of Tier 4 equipment varies by model as well as technology. However, Kleingartner says that on average, Tier 4 machines are 5 to 10 per cent more fuel efficient than their Tier 3 ancestors. Some experts point out that this is partly due
to the development of other fuel efficiency technologies, such as electronic fuel injection.

**INDUSTRY TIER 4 TECHNOLOGY CHOICES**

Doosan currently uses both CEGR with a DOC & DPF and SCR with DEF independently on different machines to meet Interim Tier 4 standards. “To meet Tier 4 Final, Doosan will use a combination of these two technologies for machines over 175 horsepower,” says Kleingartner.

Cummins Power Generation has already developed Tier 4 genset configurations that are capable of achieving Tier 4 Final. These products use both DPF and SCR technology. DEF filters have to be changed every 500 hours, notes Ananth Parameswaran, director of Cummins Power Systems and Global Marketing. “Depending upon the duty cycle of the genset, the DPF would have to be cleaned of deposited soot every 4,000 to 5,000 hours,” he says.

CASE Construction Equipment is using both SCR and CEGR to meet Tier 4 Interim. “This is in addition to a maintenance-free DOC-only solution used on some skid steer models that meet the Tier 4 Final standard,” Stemper notes. The use of multiple technologies will continue as CASE progresses toward Tier 4 Final across all equipment categories and horsepower ranges.

Caterpillar has chosen to already implement most of the technology required to meet Tier 4 Final. The bulk of Cat engines are equipped with CEGR, DOC and DPFs, and for Tier 4 Final, SCR will be added, says Cat enterprise marketing and communications strategist Robert Christmas. “This approach will enable Cat to deliver fully validated Tier 4 Final products with additional improvement in fuel consumption,” he notes, adding that in most instances, the fuel consumption improvements will more than offset the additional maintenance costs associated with Tier 4 technology.

Volvo Construction Equipment will launch machines fitted with Tier 4 Final engines in January 2014. For most engine models, Volvo CE will use SCR in addition to fully automatic DPF technology. “In the majority of cases, this option provides the best solution for the applications, climates and environments our customers operate in,” explains Bengt Johansson, a specialist in emissions and emission regulations on Volvo Construction Equipment’s engine development team. He notes that by using both SCR technology and a DPF, consumption of DEF is slightly lower.

Interim Tier 4 technology used by John Deere includes CEGR with DEF. For Tier 4 Final, depending upon the power level and engine platform, different combinations of components will be used. Two technology configurations that will be used to meet Final Tier 4 regulations include cooled EGR, a DOC/DPF and SCR, and SCR with a DOC, says Doug Laudick, product planning manager at John Deere Power Systems. The company has just introduced its 7R and 8R Family of tractors featuring the Final Tier 4 engines.

While Tier 4 Final emissions technology has not been passed into law in Canada, many industry experts believe that it is only a matter of time before Canada follows the lead of the United States.

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Working diligently to find qualified, skilled young labourers to mine gravel and build roads for generations to come is not just the responsibility of the individual company. It takes a concentrated effort from contractors, corporations, associations and other primary stakeholders to promote the benefits of the rock to road industry to students across Canada looking for the right opportunity for their working career.

For the inaugural Rock to Road Top 20 Under 40, we are pleased to promote 20 of this country’s best young workers who are providing the example for the next generation of Canada’s aggregates and roadbuilding industry. From an excavator operator in the Yukon to a project co-ordinator in Toronto, the 20 individuals on this list cover a vast spectrum of the people involved in the day-to-day operations in this industry.

Rock to Road presents its inaugural Top 20 Under 40.
The information provided on each individual is a combination of the content provided by the person they were nominated by, conversations we have had with people in the industry, and what we have learned through our own research.

Without further delay, we present the inaugural Rock to Road Top 20 Under 40!

DONN BERNAL | GM OF YELLOW LINE, AECON CONSTRUCTION

Donn Bernal has worked hard to get to the level that he has achieved.

At 37, Donn Bernal is currently heading up the development of Yellow Line Asphalt Products Limited, a new start-up asphalt cement terminal that will transform the way joint venture partners Aecon and Dufferin conduct their road construction and paving businesses.

He started his career at the ground level, working as a summer student Laboratory Technician for Ashwarren Engineering Services while studying civil engineering at the University of Toronto. Ashwarren hired him full time following his graduation, becoming the Assistant Lab Supervisor. Four months later he was promoted to Technical Supervisor, where he consulted with clients to produce mix designs, implemented RAP and MSM additives into current Marshall Mix designs, and also designed microsurfacing and Slurry Seals. His success at Ashwarren was followed by successive management roles with Lafarge, Lafarge/Capital Paving and Oxford Sand and Gravel before landing in his current role with Aecon.

Throughout these career advancements Donn has served on the board of the OHMPA and been active in committee work and on the executive. He also finds time to mentor young people getting started in the industry.

TYSON CRAIGGS | VP SALES, DISTRIBUTION AND PIT OPERATION, MISSION RIDGE AGGREGATES

Excelling in today’s rock to road industry is much like excelling at football: both take hard work, dedication and a ton of strength. No wonder Tyson Craiggs shines at both.

As a teenager with a budding football career ahead of him, Tyson worked at the family’s aggregates business during his spare time. Following four years as a star linebacker with the University of Saskatchewan Huskies, Tyson signed as a free agent with the B.C. Lions. But even with the success of his football career, he never forgot to help the family grow Mission Ridge Aggregates.

After four years with the Lions, Tyson left the game and returned home to help the family business full time. Since then, the 31-year-old has been instrumental in helping Mission Ridge move forward. Shane worked well with his aggregates supplier, as he has with many suppliers.

Despite the demands of his career, and raising a young family, he still finds time to work with youth in his community through either coaching or mentoring youth.

SHANE FULLER | PROJECT SUPERINTENDENT, AECON CONSTRUCTION

It’s not easy for a young project leader to impress an industry veteran. But on 34-year-old Shane Fuller’s last job site, the Highway 401 expansion near Woodstock, Ont., Shane did just that.

During the project Gary Brown, a 37-year veteran of the construction and material supply business and now the owner of Oxford Sand & Gravel Limited, had opportunity to meet the young man in charge. After a brief introduction, he was given a complete tour of the project where his many questions were clearly answered. On his return after the meeting Brown concluded that this was not “this youngster’s first rodeo and the project was in good hands.”

Shane worked well with his aggregates supplier, as he has with many suppliers.
Now the Project Superintendent for the Highway 407/Brock Road interchange, the first step in the expansion of the 407 eastward, Shane continues to use his strong leadership skills and the right attitude to get some of Ontario’s biggest road projects constructed on time and on spec.

**SEAN WILSON | SITE SUPERVISOR, G.W. CONSTRUCTION**

Sean Wilson and hard work seem to go hand in hand.

The 33-year-old started working in the rock to road industry by juggling studies for his fine arts degree, and working as a general labourer and tower operator with his uncle’s crushing company, Buddwil Enterprises Ltd. After having trained under the supervision of his uncle, Dean Wilson, and Buddwil’s crushing foreman, Larry Dunbar, for two years, he transferred to his grandfather’s parent company, G.W. Construction Ltd. in 1998, where he has worked his way through the ranks to the position he holds currently as Construction Site Supervisor.

But his infectious passion for his community and his industry has grown even more. Sean is currently the midst of a two-year term as Chairman of the Saskatchewan Heavy Construction Association after working his way up from committee and general director positions. In the community, Sean currently sits in his second term as a member of Council in the Village of Buchanan, where he lives and represents the Village on various municipal and district committees. He is well known in the community for his enthusiasm for promoting the village and improving the local infrastructure. His passion for roadbuilding and the people of the industry is rivalled only by his personal love of seasonal morel mushroom picking, his video and full-size arcade game collection and his beloved Delorean!

**LINTON POTZUS | OWNER, POTZUS PAVING LIMITED**

Riding paving machines with his father as a youngster put the business in Linton Potzus’ blood. Now, as the head of Potzus Paving, Linton gets to pass that same passion down to his two young children.

Linton officially began working at the company at the age of 14, spending the summers during his high school years in paving crew camps across Saskatchewan. After high school, his father Carl started putting him in charge of paving crews for smaller projects throughout the province. Now Linton oversees a staff of over 100 people at a company that juggles as many as eight separate paving projects at any given time.

Outside of the day-to-day operations, Linton is an active member of the Saskatchewan Heavy Construction Association, promoting the benefits of association memberships to sectors throughout the rock to road industry and beyond.

**GERROD MCAULEY | ACTING MINE MANAGER, JAMIESON QUARRY**

Very few people can boast that they will have 20 years of industry experience before the age of 40, but that will certainly be the case for 35-year-old Gerrod McAuley.

After graduating from high school in 1996, Gerrod entered the field immediately, working as a portable crusher operator for Valley Gravel Sales in Abbotsford, B.C. After a successful 10-year career at Valley, Gerrod moved on to Matcom Excavating, where he spent a year as a heavy equipment operator.

When he found his way to Mainland Sand & Gravel Ltd. in 2007 he really started to grow as a member of the rock to road industry, starting as an equipment operator, then a plant operator. After completing his Shift Boss Ticket, Gerrod was given the opportunity to take the position of Shift Supervisor and is currently in the temporary position of Acting Mine Manager for the Jamieson Quarry.

In addition to his full-time role with Mainland, Gerrod plays an active role on the Mine Rescue Team and the Water Rescue Team, both of which require regular training.
Richard Vernon has tried other industries, but the gravel business has always pulled him back. The 38-year-old spent 11 years at West Coast Aggregates in Abbotsford, B.C., from 1987 to 1998 before moving across town to Little Rock Quarry's from 1998-2000. After 13 years in the aggregates industry, Richard ventured into the Northwest Territories, working for Lac De Gras Construction at Diavik Diamonds. After a brief stint there, he went in a completely different direction, working with Solander Yachts from 2000-2005. But in 2005, Richard came back to the gravel business in 2005 working for Valley Gravel Sales before moving over to Mainland Sand & Gravel Ltd. in January 2006. Since his return, he has moved from being a plant operator to his current role as a shift supervisor, while also being an active member of the Mine Rescue Team.

Dustin McAuley has had a career of diverse experiences, operating equipment in various industries. Dustin started his career in the aggregates business in 1999, working at Valley Gravel Sales operating the portable crusher. He moved over to Mainland Sand & Gravel Ltd. in 2004, where he got a wealth of equipment operation experience operating loaders, excavators, rigid frame trucks and Wiggly trucks. At present, Dustin currently works at Mainland’s Jamieson Quarry operating a loader. What sets Dustin apart is the active role he has taken in immersing himself in Mainland’s OHSC (Occupational Health & Safety Committee), who meet monthly to discuss the safety issues for Mainland’s entire operation. That work is in addition to joining his brother Gerrod as an active member of the company’s Mine Rescue Team.

Michael Black learned to love heavy equipment at a very young age. He started rebuilding old tractors alongside his grandfather as a kid, and has been working on machines every since. After graduating with his heavy truck and coach mechanics licence, Mike ran his own business for eight years, working on machines and learning about the industries they serve. Mike joined Tri City Materials in 2007, playing several different roles interchangeably from driving tri-axle equipment to serving as lead mechanic. Mike currently holds the title of Fleet and Purchasing Manager, but wears several other hats at the same time, leading the maintenance crew and providing repairs for any and all machinery owned by Tri City. Mike was also instrumental in adding a new facet to the Tri City operation, helping set up and maintain the company’s new wash plant system introduced in 2010.
WES ESBAUGH | OPERATIONS MANAGER, TRI CITY MATERIALS

Wes has played in the rocks and dirt his whole life. It was only a matter of time before he made a career out of it.

After finishing high school in 2005, Wes went on to study concrete technology at Alpena Community College in Alpena Michigan. Upon completion of his diploma, he returned home to the family business, Tri City Materials, starting as a loader operator before working his way up to Operations Manager.

In a few short years with the family business, Wes’ knowledge and fresh perspective on the industry has helped grow Tri City in the Kitchener-Waterloo area and has helped to keep its custom crushing operation moving forward. He has also helped to introduce and sustain a recycled aggregates products business, which is run out of one of Tri City’s five regional pits and provides an environmentally sustainable solution for both government and commercial clients. He has also helped provide additional reserve materials for the company’s own aggregates needs.

DONALD CHISHOLM | PRESIDENT, NOVA CONSTRUCTION LTD.

Donald Chisholm has always been a Nova Construction guy.

Donald began working for Nova Construction Co. Ltd. as an equipment operator in summers during his high school years, and continued through university with increasing roles of responsibility and supervision until he completed his degree in business. Today, he is President of the company.

Donald has played a major role in expanding and leading Nova Construction in the roadbuilding industry. The company has been granted significant roadbuilding contracts over the past five years, which have resulted in the purchase of additional rock quarries and crushing equipment. Before 2013, it had been 30 years since Nova was in the paving business. But thanks to the recent purchase of a new Astec 300 Paving Plant and the related equipment, spearheaded by Donald, the company has returned to paving roads in Nova Scotia.

In addition to the leadership that Donald has provided at Nova Construction, he has used that leadership to try to help the industry in Nova Scotia, currently serving as past president of the Nova Scotia Roadbuilders Association.

DEAN ARNILL | PRESIDENT, WESTERN ASPHALT PRODUCTS

Dean Arnill knows that pavement preservation is serious business.

Dean represents the fourth generation of the family business, now known as Western Asphalt Products, which focuses on high-quality asphalt emulsion products used for highway maintenance.

Since working with Bill Diamond to create Western Asphalt Products in 2011, Dean has designed and built two emulsion plants in Western Canada, with one located in Brandon, Man., and the other in Bruderheim, Alta. Since then, Western Asphalt has been shipping emulsion to the Province of Manitoba, City of Saskatoon and several other counties in Alberta, Saskatchewan and Manitoba. All of the emulsions are custom made in AASHTO-certified labs.

In addition to his work with the company, Dean has been very active in promoting pavement preservation and knowledge transfer across Canada.

DONNY WEISENBERGER | EXCAVATOR OPERATOR, JEDWAY ENTERPRISES

Donny has been running equipment for most of his life – at least the part he is old enough to remember. Donny started running machines of different shapes and sizes at the age of four and since then has never looked back. After graduating from high school, Donny immediately pursued a career in the rock to road industry and latched on to Jedway Enterprises, which has offices first in British Columbia and in the Yukon.

Now just 20 years old, Donny already has more than two years of equipment operation under his belt. He has worked as an efficient and effective operator of a Hyundai excavator first in British Columbia and now in Langley, Yukon.

At the age most kids have finished college or university, Donny is already making his mark as a skilled equipment operator with plenty of room for growth.
BILL MARQUART | OPERATIONS DIRECTOR, CBM AGGREGATES

It’s no coincidence that the rapid growth of CBM Aggregates and the rapid ascension of Bill Marquart in the aggregates industry happened simultaneously.

After spending summers during his post-secondary education working in the industry, Bill was hired by Blue Circle following the completion of his degree in Environmental Resource Planning from the University of Northern British Columbia. Bill then became the Lands Manager for CBM Aggregates after Votorantim purchased a portion of the Blue Circle assets.

Bill was a key part of the aggregates team that build CBM’s business from a small handful of sites in 2001 after the purchase by Votorantin, to a business that now has 25 shipping locations and 75 licences across the province. In 2007, Bill took on a leadership role in operations, as Western Regional Manager for CBM’s plants in London, Cambridge, Aberfoyle, Limehouse, Orangeville and Hillsburgh, Ont. After assisting with the acquisition of Prairie Materials, Bill was promoted to Director of Operations, and now heads up the Operations Division for all 25 CBM Aggregates locations.

Bill is recognized throughout the company as an innovator, and he has contributed to the company’s success in many areas of the business. Always approachable, he has been a mentor to many, sharing his perspective and experience on the industry. Bill currently serves on the board of directors for the Ontario Stone, Sand & Gravel Association.

TYLER KOSICK | OWNER, TRANS CARRIER LTD.

Trucking, aggregates, roadbuilding, all in a day’s work for Tyler Kosick and Trans Carrier Ltd. After returning from a post-secondary tour filled with competitive hockey and some business courses, Tyler returned home to work with the family to grow what was then known as Kosick Holdings Inc. In the early 2000s the family decided to combine its gravel business and road maintenance operations with its oilfield trucking division to make a stronger Trans Carrier, which was then bolstered by the purchase of Backcountry Trucking Ltd. a few years ago.

After years learning the ropes by working in equipment operation, dispatch, sales and supervisory roles, Tyler took over the family business in 2008, growing the operation from 50-60 employees to 75-100.

Tyler is active in the industry, formerly having served as the president of the Fort St. John Petroleum Association while being a longtime active member of the B.C. Stone, Sand and Gravel Association. Earlier this year, Tyler was given a Queen’s Diamond Jubilee Medal.

VIMY HENDERSON | PAVEMENT AND MATERIALS ENGINEER, GOLDER ASSOCIATES

Through extensive research and development, Vimy Henderson hopes to help the rock to road industry build strong, more sustainable roads across the country.

During her doctoral studies at the University of Waterloo’s Centre for Pavement and Transportation Technology (CPATT), Vimy led a Canada-wide project on the use of pervious concrete pavements, programmed a Material Test System (MTS) for asphalt pavement performance testing, and performed and organized laboratory and field testing of rigid and flexible pavements.

Since finishing her doctorate, Vimy has moved on to Golder Associates, where she is working on the implementation and field testing of several different types of asphalt pavements, including conventional and modified asphalt technology; cold in-place recycling using emulsion and foamed asphalt; full-depth reclamation, including foamed asphalt stabilization; and preventive pavement treatments.

Vimy’s research has been presented at major conferences both nationally and internationally and she is an active member of the Ready Mix Concrete Association of Ontario’s Pervious Concrete Subcommittee.

JEFF PFAFF | VICE-PRESIDENT, SCI STABILIZATION INC.

Being able to notice a growing trend in the road construction industry has paid dividends for Jeff Pfaff.

After working on job sites throughout parts of Canada and the United States, Jeff
recognized the growing trend towards the use of soil stabilization techniques for road building projects. He has since taken that know-how back to southern Ontario, partnering with a colleague to start SCI Stabilization in the small town of Blenheim.

Since starting SCI in 2012, the company has been involved extensively in the renewable energy sector, providing stabilization services for the wind and solar power industries. The company is now preparing to tackle the multibillion-dollar Samsung wind and solar projects in southern Ontario.

**KRIS WATRICH | AGGREGATES MANAGER, BC INTERIOR, LAFARGE**

When Roy Bertram heard about the Rock to Road Top 20 Under 40, he immediately thought of Kris Watrich. The 34-year-old Watrich, who obtained a bachelor of science in geophysics from the University of Alberta, has already proven his ability to steer important portfolios for the company.

Before joining the Lafarge operation at the BC Interior office, Kris had been working on special projects in Newton, including market analysis, aggregates testing and performance analysis. He didn’t have a ton of experience working directly with aggregates at the time, but Bertram recognized Kris as “a bright young guy who catches on quick.”

Watrich took over as Aggregates Manager of the BC Interior branch of Lafarge in West Kelowna in March of 2011. As part of his new position, Kris has worked to teach the public about sustainable construction by engaging Grade 5 students throughout the region during their renewable materials unit.

**MARK PIOTTO | TERRITORY SALES MANAGER, GEOSHACK**

Mark Piotto may be Canada’s biggest advocate of 3-D and GPS paving systems, and not just because he sells the equipment. He has seen firsthand the value of these emerging technologies as more and more roads are built using the equipment.

Prior to joining Geoshack in 2005, Mark worked as an assistant field manager for the construction of commercial and residential highrises. Since joining Geoshack, he has learned the roadbuilding trade thanks in part to the mentorship of colleague Dan Hendricks, whom Piotto credits with helping him understand the growth of these new technology platforms.

In addition to gaining a solid reputation as a territorial sales manager for Geoshack’s lines of Topcon equipment, and as one of the top Topcon salespeople in North America, Mark has focused his efforts on the fulfilling the need for greater education for the those in the industry, helping to grow Geoshack’s training programs from six students in 2007 to more than 500 in 2013.

At 38, Mark also plays an active role as a member of the Ontario Road Builders’ Association and the Greater Toronto Sewer and Watermain Construction Association.

**RYAN JONES | PRESIDENT, TARANIS CONTRACTING GROUP**

For Ryan Jones, everything started 18 years ago when he was just a business student with a good idea of how to make some extra money during the summer to help pay for school. He came up with The Gravel Doctor, which operated with an attachment on the back of a tractor to dig up gravel paths.

Fast-forward to 2013. The Gravel Doctor days are behind Jones, as he expanded the operation to become the Taranis Contracting Group in 2009. Taranis now has an employee base of part-time and full-time staff hovering just under 300, and an extensive breadth of services to offer.

The 38-year-old’s vision, leadership, and ability to understand the needs of the northern Ontario landscape has vaulted his company into one of the largest aggregates suppliers and roadbuilders in that end of the province. With eight pits and three quarries, plus an on-site training school, Taranis has the resources to attract the next generation to his business and keep them there.

And it all began with a side business in university.

We at Rock To Road congratulate these individuals for their hard work and dedication to this industry. They have provided examples that can help all of us as we work together to promote the benefits of working in Canada’s rock to road industry to schools and students across Canada.
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The introduction of stricter emissions standards for commercial Canada has been widely speculated for years, and has transitioned from possibility to inevitability.

Recognizing what the industry is about to face, Lafarge’s North American operations are taking a proactive approach to finding a solution to reduce carbon emissions. By using knowledge of energy solutions from throughout the company’s global operations and adding partnerships with companies across the region, the Bath, Ont., plant of Lafarge Canada is working on a solution that can be universally adopted by all of its production facilities.

Located along Lake Ontario approximately 250 kilometres ENE of Toronto, Lafarge’s Bath plant is built next to a large limestone quarry, which supplies 90 per cent of the materials needed for sustainable production. The site has been active since 1972, and currently produces close to 1.1 million tonnes of cement each year with a workforce just shy of 100 employees. The quarry, which sits on the north end of the property, has the capacity to supply the cement plant with limestone for an estimated 300 to 400 years at Lafarge’s current rate of production.

Lafarge’s Bath plant experiments with biomass to reduce its carbon footprint.
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Presently the site burns a combination of coke and coal fuel, which is imported from Virginia, plus natural gas. Approximately 80 per cent of the cement produced is shipped via boat thanks to its dock on Lake Ontario, right across Highway 33 from the plant. The cement shipped by boat supplies the Greater Toronto Area, where Lafarge’s largest customer base is located, as well as customers south in to Cincinnati, Ohio and New York. The remaining 20 per cent is shipped by rail and truck, the bulk of which supplies customers in the inland parts of northern and central Ontario and to customers in Saskatchewan.

**A CORPORATE COMMITMENT**

Even before Canada started rumbling about the introduction of new emissions standards, Lafarge’s global operations were looking at ways to reduce their carbon footprint.

“Lafarge has had environmental sustainability as a priority for many years,” says Richard Sebastianelli, plant manager of the Bath operation. “The target has been for Lafarge to reduce CO₂ emissions, and there have been projects done in many Lafarge cement plants. We’ve started this focus on LCF (low carbon fuels) in the last four years.”

With its base of operations in Paris, France, Lafarge has already seen the impact of using low carbon fuels as a result of the use of biofuels in most European markets. That research, development and usage has provided a knowledge base for Lafarge’s North American operations to begin exploring LCF solutions for plants like the one in Bath.

But rather than just rely on the information already available within the company, the Bath operation has sought the opinion and expertise of community members to help form the framework to find the best LCF solution for the plant.

“What is innovative and different about what we’ve done here is that, rather than just sit around and figure out a solution internally, we actually opened up our boardroom to the public,” says Robert Cumming, environmental and public affairs manager for the Bath plant. “We’ve had people from Queen’s University, Pollution Probe, WWF Canada and the local community sit down with us to discuss what we can do together.”

One of the primary solutions desired by Lafarge was being able to identify local feedstocks that can be used as low carbon fuel. Importing fuel to run the cement plant has always been an issue for Lafarge with few to no local resources available.

“We’re importing fossil fuels into Ontario, in our case, from Virginia,” says Cumming. “We just don’t have the resources in Ontario.”

There are, however, LCF resources available in Ontario. Finding those local sources provides both an environmental and economic benefit for Lafarge, and the entire cement industry in Canada.

“The hundreds of millions of dollars our industry is spending on importing coal and coke we could be spending locally instead,” explains Cumming. “So there’s a big economic benefit. We’re making use of materials that would go to the landfill, rot, and create methane. Plus, we’re leaving coal in the ground. So actually, it’s a double benefit.”

After working with a committee of community stakeholders, a few items were quickly established. First, the committee recognized the need to go through a process of determining the best LCF for Lafarge rather than jumping to an unproven conclusion. Each of the possible fuels would be evaluated based on three questions: is it economical, is it environmentally sound and is it socially responsible? By using those criteria, Lafarge would provide a solution that made sense for all stakeholders involved in the process.

**REFINING THE TARGETS**

The next step was to establish the targets for the LCF testing phase and permanent implementation of the project. Based on those percentages, Lafarge could construct a timeline for both phases of the project, have an accurate read on the volume of the low carbon fuel the company would need in order to be sustainable year over year, and determine the cost of the LCF for the bottom line.

For the testing phase of the project, Lafarge was granted environmental compliance to co-fire 10 per cent LCF, but the overall target would be much bigger.

“We’re permitted to co-fire 10 per cent at the moment, but our target is to be at 30 per cent,” says Sebastianelli. “This is where it makes the most sense to be using this type of technology. In North America, there are some plants that use around 35 per cent LCF but we want to meet our target of 30 per cent.”

Lafarge sent out a request for information, looking for a
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The results of the request for information process have been the selection of Lafarge's first mix that will be tested at the plant. The first blend to be tested will be a mix of grinded railroad ties, along with wood and asphalt shingles from construction waste.

Scott Environmental Group, based out of nearby Kingston, Ont., has been hired to handle the construction waste. The company will have to add infrastructure in order to both handle the waste and meet the 3/8” minus dry fuel spec needed by Lafarge. As for the railroad ties, those will be handled by a local Metis-run family business, Rail Link Inc., who will be grinding and crushing those materials on the Lafarge site.

Lafarge is building a new receiving area, which will include moving floors that will allow workers to remove the materials from the trucks. The materials are then stored in large bins before being fed up to the burner floor. At that point, the materials will be mixed together to meet the desired specifications, then metered through a rotary air lock and way feeder where they will be blown directly into the kiln. The flame temperature in the kiln will be 2000 °C. The environmental compliance approval given to Lafarge will allow them to burn 75 tons of LCF per day during the three-year testing period.

The target is to make the fuel replacement without any interruption to cement production at the Bath plant.

“We don’t want to jump into this and immediately start having issues,” says Sebastianelli. “We want to gradually increase the rate as people get comfortable with the equipment and get acquainted with how everything has to operate.”

The introduction of the 10 per cent LCF mix will create a 10 per cent CO² reduction from fuel combustion, according to estimates made while researching the mix. There is expected to be a nitrous oxide reduction as well, but that number has not yet been determined. However, thanks to a partnership with Queen’s University, Lafarge will have access to unprecedented data from the trial burn. Queen’s will be performing before and after emissions testing, quality assessment and life-cycle assessment, which will compare the environmental cost of coal coming out of the ground in Virginia and being shipped to Lafarge versus the cost of construction waste coming out of a house and asphalt shingles coming off a roof.

“We expect those results to help form government policy in Ontario,” says Cumming. “This is why the government supported this initiative by providing $2.68 million for the project.”

With the first test expected to begin in October, Lafarge estimates that the first set of data will be completed by Queen’s four to five months later. Should the current mix meet Lafarge’s expectations, the company would then apply for a permanent environmental compliance application. The earliest possible permanent approval could then be awarded as early as the fall of 2014.

For more on aggregates, visit www.rocktoroad.com
In 1974, we started making asphalt plants with a simple philosophy. Take care of the customer and business will take care of itself. More than 35 years later — with over 1,000 ADM plants operating in 40 countries — that philosophy is what sets us apart. With a plant to compete on any level and the type of personal service you won’t find with the big guys, we make it easy for you to take care of business.

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Mainland Sand and Gravel Ltd., based in the Vancouver suburb of Surrey, started small 43 years ago as a supplier of sand to the regional construction industry. Since then it has grown to become one of the largest suppliers of aggregate in the Lower Mainland (the region in the southwestern corner of the B.C. mainland that includes and surrounds Greater Vancouver). How Mainland climbed to the top is an interesting story and an example of the importance of focus, tenacity and family loyalty for achieving success in the aggregate business.

Mainland was founded in 1970 by Laurie Carlson and his brother Mel Carlson. “Laurie was an accountant, and one of his clients had a business that dredged and sold sand from the Fraser River,” says Mainland president Ted Carlson (Laurie’s eldest son).
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†Max. gas horsepower of 385 and diesel horsepower of 400 on F-250/F-350. Class is Full-Size Pickups over 8,500 lbs. GVWR vs. 2012/2013 competitors.
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§Based on Ford drive-cycle tests of comparably equipped Ford and competitive models. Class is Full-Size Pickups over 8,500 lbs. GVWR.
*Percentage based on Polk U.S. heavy-duty pickup and class 2-5 Conventional Chassis Cab combined new registrations (2011 CYE – 2012 CYTD JUNE) within the following U.S. industries: Metal Mining, Heavy Construction Except Building. ©2013 Ford Motor Company of Canada, Limited. All rights reserved.

TRUCK OWNERSHIP (US INDUSTRY DATA):*

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†Max. gas horsepower of 385 and diesel horsepower of 400 on F-250/F-350. Class is Full-Size Pickups over 8,500 lbs. GVWR vs. 2012/2013 competitors. ‡Maximum conventional towing capability of 18,500 lbs. on F-350 when properly equipped. Class is Full-Size Pickups over 8,500 lbs. GVWR vs. 2012/2013 competitors. *Percentage based on Polk U.S. heavy-duty pickup and class 2-5 Conventional Chassis Cab combined new registrations (2011 CYE – 2012 CYTD JUNE) within the following U.S. industries: Metal Mining, Heavy Construction Except Building. ©2013 Ford Motor Company of Canada, Limited. All rights reserved.
“His client’s son inherited the business, but he didn’t want it and sold it to Laurie.”

In the 1970s, the company realized there was a growing demand for sand, gravel and crushed stone products, and acquired several sand and gravel pits. Because the pits had a limited life span, Mainland started looking for a larger source of raw material that was close to the water, so the company could use barges for transportation.

The two-year search ended in the purchase of a 400-acre site on the Fraser River called Cox Station. Once the necessary permits had been acquired, Mainland built a barge loading facility on the site. The first aggregate shipped from Cox Station, in 1986, was produced from an alluvial deposit of natural sand and gravel. But the deposit was quickly exhausted and in 1987 Mainland began drilling and blasting solid granite at Cox Station. Today, almost all of the material produced at the site is shipped out by barge to the company’s distribution depots along the Fraser River, and direct to customers’ projects. Mainland has shipped more than 16,000 barges of aggregate since 1986.

In 2002, Mainland acquired Jamieson Quarry in Abbotsford, B.C. A land-based quarry, Jamieson ships all of its 100 per cent fractured product by truck. Most of it goes to local markets in Abbotsford, Langley and Surrey.

Mainland produces quarried products, river sand, and recycled concrete and asphalt products. Carlson says Mainland pioneered the use of quarried products in the Lower Mainland in the late 1980s, when most construction-grade aggregates were still produced from alluvial natural sand and gravel deposits.

“Since then, quarried products have gained significant market share in the Lower Mainland,” Carlson says. “In many applications today, quarried products are specified as the only suitable material, because of their superior performance as base gravels.”

Carlson says Mainland’s river sand is used in a variety of applications, such as pre-loads, base on grass playing fields, sub-grade fill, and top dressing sand for golf courses.

“One of the main uses of river sand is pre-loading, because it weighs less than comparable volumes of other sand products, such as bank sand or pit sand,” Carlson says. “River sand consistently weighs between 1.55 and 1.65 tonnes per compacted cubic metre, which gives it a weight advantage of between 10 per cent and 20 per cent over other types of sand. That can add up to big savings, by reducing the number of tonnes required to achieve the desired volume.”

Mainland also supplies recycled concrete and asphalt products from demolitions and repaving projects.

Mainland operates four distribution yards and two producing quarries and produces more than five million tonnes of sand and gravel products per year, which makes it one of the largest suppliers in the Lower Mainland.

The company has a wide variety of customers: Construction job sites, road builders, railways, utilities, contractors, builders of single- and multi-family housing, marine contractors, municipalities, and provincial and federal governments.

Mainland has a large fleet of equipment. The company’s rolling stock includes 13 Caterpillar front-end loaders; one Volvo front-end loader; and five Komatsu front-end loaders. In addition, it has eight Caterpillar rigid-frame trucks, three Caterpillar 740 articulated trucks, one Caterpillar 345 D excavator, one EC 380D Volvo excavator, one EX 1100-3 Hitachi excavator and one PC Komatsu excavator.

The company’s complement of support equipment includes one Caterpillar 14G grader, one Caterpillar 236 skid-steer loader and one Caterpillar Telehandler. Mainland has two drills: one Ingersoll Rand DM45E down-the-hole (DTH) drill and one Sandvik D25 KS DTH drill.

The Cox Station Quarry includes a 3,500-foot conveyor system to allow for barge loading.
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Mainland’s Cox Quarry has three crushing plants equipped with crushers, screen decks and conveyors. It also has a portable crushing plant and wash plant. In addition, Cox has a 3,500-foot conveyor feeding a barge loading system.

At Jamieson Quarry, all the production is contracted out to Pacific Site Concrete.

Recent equipment purchases include two new Caterpillar 980 H loaders, two new Caterpillar 775G quarry trucks, one new Volvo L35 OF front-end loader, one new Volvo EC380D excavator, one new Komatsu WA900-3 front-end loader, one new Komatsu WA600-6 front-end loader and two new Pacific Industrial Scale portable weigh scales.

Carlson says the reason for the purchases is that during the recession the company didn’t replace much of its older equipment.

“Now we’re catching up and adding new capacity,” he says. “And in the next 12 months, we’ll be looking to buy more equipment, such as articulated trucks, a front-end loader, and crushing, screening and conveying equipment.”

Carlson says Mainland buys, rather than leases, all of its equipment. “It’s the most cost-effective way to finance the purchase of our equipment,” he says.

Mainland has 100 full-time employees: 75 are operators and 25 are management and office staff. Carlson says the company has had no trouble finding employees. “We have a good reputation in the industry,” Carlson says. “In the future, however, it might be harder to find young men and young women to replace staff as they retire.”

The Carlson family is still Mainland’s sole owner. In addition to president Ted Carlson, founder Laurie Carlson is CEO and Laurie’s youngest son, Brent Carlson, is vice-president.

Ted Carlson says what makes Mainland different from its competitors is that it doesn’t compete with its customers by doing contracting or placing work.

“We have grown horizontally rather than vertically to appeal to as wide a customer base as possible,” he says.

For more on aggregates, visit www.rocktoroad.com

Mainland uses a variety of transportation resources for moving aggregates to its customer base throughout the Fraser Valley. The Jamieson Quarry ships 100 per cent of its aggregate products by truck.

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The development of cold mix asphalt has provided a new solution for road and pavement repairs in Canada. Cold mix asphalt allows for repair work to be done in all temperatures without worrying about being able to keep the asphalt hot during transport from asphalt plant to job site.

While several equipment manufacturers have worked to develop paving plants that process cold mix asphalt, allowing for larger paving projects to be completed using just the cold mix material, portable cold mix solutions are also being developed.

In B.C., Mainroad Maintenance Products LP, located in the Vancouver suburb of Surrey, is marketing a polymer-modified cold asphalt called EZ Street that, it claims, is guaranteed to permanently repair potholes, utility cuts, overlays and edge repairs in asphalt or concrete.
The EZ Street cold asphalt mixes come in two versions: Regular EZ Street, which has regular diesel as one of its ingredients, and Bioblends EZ Street, which is made with 100 per cent renewable resources and selected recycled materials.

EZ Street cold asphalt can be applied when air temperatures are between -18 C and 38 C. “But EZ Street will be most pliable, workable and able to be compacted at air temperatures between 10 C and 32 C,” Hoare says. “In the winter, you can warm the material before you apply it, although you must take care the temperature of the material temperature doesn’t go above 50 C.”

Hoare says that, to ensure best performance, EZ Street should be applied and compacted in two-inch maximum lifts.

“Compacting the material using a vibratory steel wheel roller will give you the best results,” he says. “But wheel rolling using steel wheel or pneumatic rollers, or compactor plates, will also work. And over-compacting is rarely a problem.”

While EZ Street has been primarily used for smaller projects such as pothole repair, utility pole installation and pedestrian pathways, there are larger installations that are also finding success in laying cold mix asphalt as a paving solution.

For example, Bowen Island, a small municipality of 3,500 people near Vancouver, recently used Bioblends EZ Street as paving overlay on a stretch of road 50 metres long by five metres wide.

“We've been using EZ Street for about the last four years,” says public works foreman Kevin Toews. “In addition to paving overlay, we use it to fill potholes and to patch road shoulders. Application is straightforward. We shovel it from the truck onto the asphalt as an overlay, compact it, then throw sand on it and it's ready to drive on almost immediately.”

One of the reasons why Toews has chosen to use a cold-mix asphalt product is that he finds the versatility of the product to be valuable for his operation.

“It works on both flat and steep grades and it stands up to any weather conditions,” he says. “We use about five truckloads of it per year.”

The B.C. Ministry of Transportation and Infrastructure (MOTI), which oversees an extensive road paving, repaving and maintenance program, used EZ Street’s regular cold mix asphalt on a mill and pave project on a 1.4-kilometre stretch of well-used Highway 99 that runs south from Vancouver to one of the busiest U.S. border crossings in Canada. The original conventional hot-mix asphalt surface had suffered severe alligator cracking.

“We heard about of the benefits of EZ Street asphalt, so we completed a test section,” says MOTI operations manager Thomas Chun. “To date, the cold mix asphalt has performed as we expected, in that it has held together well. There are some settlements, but that is base-related and we were aware of those. The ministry will continue to monitor this segment of roadway to determine the long-term impact.”

While some paving contractors remain skeptical about the use of cold mix asphalt, the results being found on Canada’s west coast are providing some good reasons why cold mix asphalt could emerge as an effective solution for road paving and repair.
Asphalt milling is the process of grinding up asphalt that can then be recycled. The process came about because many streets were getting layered higher and higher as new surfaces were added, thus reducing the curb height and creating roadway drainage problems. From the start, the emphasis for milling machines was to place more power to the cutting drum in order to remove more material. Thus, the cutter head itself and the cutting teeth designs became critical. The cutting teeth would dull fairly quickly and needed frequent replacement. The replacement process could cause enough downtime to greatly detract from the initial efficiency of the milling process itself. So manufacturers worked on designs for quicker replacement as well as increased durability of the cutting teeth. Different sized cutting drums were offered so that machines could mill at different widths.

Milling machines feature conveyor systems to collect the material during the milling process, thus reducing the labour of picking up the material from the roadway. Newer models require two or more people to operate safely and efficiently. The operator stands on the deck of the machine and controls most of the machine's functions, while a worker on the ground controls the depth of the cut and keeps an eye out for obstructions in the roadway such as manholes and/or water valves.

Today’s machines are bigger and more technologically advanced. They are designed to handle any asphalt aggregates in use today. Depending on the depth of the cut, some of the larger machines can cut close to 15,000 square yards (13,000 square metres) a day, at 75 feet (22.86 metres) per minute.

In addition to faster speed, added precision to the milling process has become important.
The innovation of controls and automation has brought greater precision for controlling slope, depth and speed.

There is no question that the technological advancements made in microelectronics have benefited milling machines. Electronics designed to improve performance, include electronic sensors and a built-in cross slope. A pair of sensors can read a variety of references from 12 to 55 inches directly below the bottom of the sensor. Each sensor can be calibrated and adjusted from the ground level or at the operator's console.

The position of the rotor in relation to the grade reference can be constantly displayed on the central controller. Changes to the elevation controls include the addition of a raise/lower switch that is used when milling around obstacles. In many cases, the electronic control module monitors and regulates the performance of major machine systems, including speed, steering, rotor drive and other functions. If a problem occurs, a warning is issued.

Along with the electronic features that keep milling machines on track are the advances being made in the cutting end of the machines. The ability to change cutting drums quickly to achieve multiple cutting widths with the same machine is a benefit to contractors who may need only one machine to accomplish multiple job requirements.

Some manufacturers add flexibility to the machines by manufacturing and assembling the milling tractors and cutters separately, allowing the contractor to choose from several cutter patterns and widths when ordering equipment. The cutter assembly is designed for quick changing of cutting pattern styles and widths.

Roadtec machines also have the ability to mill in two different directions to accomplish different results. Traditional milling is accomplished in an up-cut direction. But Roadtec's offerings also can down-cut, which is designed to control slabbing, permit pulverizing and mixing, and can be an effective way to remove material over wet base. The down-cutting feature is also designed to convert Roadtec milling machines into cold-in-place recycle machines.

Today's milling machines also reduce the time required to change the all-important cutting teeth. Early machines had the teeth welded on, so tooth replacement required a fair amount of downtime as each had to be re-welded to the drum. Now, teeth are held in variously designed bolt-on housings that permit faster changing. Also, some machines come with an air compressor as standard equipment, allowing the use of pneumatic tools for quicker tooth changes.

A relatively recent innovation to milling has been the introduction of micromilling. A big benefit of micromilling that is shaping the future of road milling is that the micromilled surface is smooth enough for road users to travel relatively fast over the surface during construction. Contractors can open the milled surface to traffic and come back later with an overlay. Cold winter provinces especially can save the cost of patching in the fall by micromilling instead. They then can then get an early start in the spring with paving.

From its early days, the milling machine has had a dramatic impact on road construction. Ongoing improvements and innovations to the machine will continue to secure its pre-eminent role in road reconstruction.

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new products

BOMAG introduces tandem roller

Powered by a Tier 4i, 32.6-horsepower, water-cooled Kubota diesel engine, the BW100AD-4 tandem vibratory roller is built for asphalt and base compaction, road shoulder work, parking lots, and asphalt patch repair.

The BW100AD-4 delivers up to 8,350 pounds of centrifugal force per drum and a maximum frequency of 4,200 vibrations per minute. A standard crab walk allows the roller’s rear drum to be offset by 1.6 inches in either direction, allowing excellent maneuverability around site obstructions.

A new Smart Drive steering wheel has a smaller diameter, enhancing operator comfort and providing a clear view of all indicator controls. The suspended operator’s platform is also equipped with a fuel level indicator and hour meter.

A maintenance-free, bolt-on articulating and oscillating joint and flexible scrapers for each drum simplifies service requirements for the roller. A 58.1-gallon water tank and pressurized spray system feature filtered nozzles and windscreen protection for uniform coverage.

Standard safety features on the BW100AD-4 include ROPS with safety belts, back-up alarm, and emergency stop button. Additionally, the roller’s engine cover and dashboard are lockable to protect against vandalism.

Martin Engineering offers high-impact cradle

Martin Engineering’s new high-speed impact cradle is designed to reduce roller and frame damage from heavy conveyor loading conditions in mining, coal handling, aggregates and other applications involving dense materials and/or high volumes. The rugged EVO High Speed Impact Cradle is engineered to withstand difficult operating conditions, reducing roller failures and service requirements.

The new cradles use Martin Engineering’s Trac-mount technology to slide in and out easily for maintenance. The modular components are light enough to be removed by hand, without using a crane or other equipment to handle them.

The new load zone design uses an elastomer bar suspension system that absorbs and distributes the material load being transferred, reducing the stress on the idlers’ rolling components and support structure. One patent-pending design innovation is the use of connecting brackets near the top of the idler frame to hold the three rollers together. These special brackets are designed to allow multiple modular cradles to be tied together, so that the idlers throughout the entire load zone work together as a system.

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Terex CRH1316 features new crusher discharge design

Terex Minerals Processing Systems (Terex MPS) has expanded its CR Series portable plant line with the addition of the Terex Cedarapids CRH1316 horizontal shaft impact crushing plant. This large-capacity, highly portable, electric plant features a large under-crusher vibrating pan feeder to accept the high-velocity crusher discharge material and convey it to the straight-line product conveyor. This unique design eliminates impact damage to the conveyor belt and maintains maximum belt tension to prevent slippage, while providing a very large discharge opening to prevent blockages.

The CRH1316 also offers a variety of options including a self-cleaning magnet, electrical panel with hydraulic lift, hinged hopper extensions and hydraulic run-on jacks. To complement the CRH1316, Terex MPS has also released the new CRC380X and CRC450X cone plants and the CRS6203V screen plant. These units can mate up with the impactor plant to create a large-capacity closed-circuit crushing and screening system without the need for additional interplant conveyors.
For an updated list of events, visit www.rocktoroad.com

**2013**

- **December 5-7**
  - B.C. Road Builders’ AGM and Conference
  - Victoria, British Columbia
  - roadbuilders.bc.ca

**2014**

- **January 8-11**
  - National Pavement Expo 2014
  - Fort Lauderdale, Florida
  - NationalPavementExpo.com

- **February 3-4**
  - 2014 ORBA Convention
  - Toronto, Ontario
  - orba.org/events

**2014**

- **March 4-8**
  - CONEXPO-CON/AGG
  - Las Vegas, Nevada
  - conexpoconagg.com

- **April 3-4**
  - Atlantic Heavy Equipment Show
  - Moncton, New Brunswick
  - masterpromotions.ca

- **June 24-26**
  - Hillhead 2014
  - Buxton, England
  - www.hillhead.com

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The Centre for Pavement and Transportation Technology (CPATT) is a partnership between universities, the public sector and the private sector that involves a board of advisors and a research team responsible for the planning, management, and conduct of the research program. This is possible with the use of the central lab facility at the University of Waterloo, the main field lab facility, a test site at Waterloo Region’s Waste Management Facility, as well as a number of satellite test sites and liaisons with other labs.

The CPATT Test Track was constructed in June 2002. It was the result of a partnership between federal, provincial and municipal governments, private sector, and the university. The Test Track is located in the southeast corner of the Regional Municipality of Waterloo’s Waste Management Facility. Over the last 10 years, visitors from all over the world have come to see the Test Track and learn how it is being used to advance pavement engineering, not only in Ontario but across Canada.

In 2002, the Test Track consisted of a 700-metre-long test strip, with various asphalt mix designs, embedded sensors, various weigh-in motion devices, wireless data transmission, trenchless and trenchless installations of high density polyethylene pipe and geogrid reinforcement. Now, the Test Track is 1294 m long and 8 m wide. It includes 15 different types of pavement including the five original asphalt surface mixes: Hot-Laid 3 (HL3), Polymer-Modified Asphalt HL3 (PMA), Stone Mastic Asphalt (SMA), SuperPave, Conventional Jointed Plain Concrete Pavement (JPCP) with 15 per cent Recycled Concrete Aggregate (RCA), JPCP with 30 per cent RCA, JPCP with 50 per cent RCA, and a Recycled Asphalt Shingles (RAS) section. The first portions of the Test Track, which contain two control sections and three flexible sections, were constructed in June 2002. The JPCP sections were constructed in June 2007 with a control section and varying percentages of RCA including: 50, 30, 15, and 0 per cent. The last section of the Test Track is a HL3 RAS mix design and it was constructed in 2009.

In partnership with the Cement Association of Canada, CPATT is conducting a research project where the general objective is to increase friction and noise absorption in concrete pavements. Previous research to increase friction and reduce noise production has been focused on creating different surface textures through macrotexture modifications. Due to the key role that microtexture has on pavement, the first innovative stage of this research involves the study of concrete response based on microtexture modification using nanotechnology, because nanotechnology acts on the concrete microstructure. The second stage of this research will be to create new geometrics on the top of concrete pavement through macrotexture modifications.

The research being done on recycled asphalt pavement is in partnership between CPATT, the Ministry of Transportation Ontario (MTO), the Ontario Hot Mix Producers Association (OHMPA), and the Natural Science and Engineering Research Council of Canada (NSERC). This research is aimed at fostering innovation for greener roads in Ontario, Canada. Ontario’s experience with low percentages of Recycled Asphalt Pavement (RAP) in Hot Mix Asphalt (HMA) has proved satisfactory in terms of fatigue, rutting, thermal resistance and durability. However, the opportunity to consider high percentages is present. Currently, RAP is limited to between 15 and 20 per cent since performance of the resultant HMA mixture is influenced by characteristics of RAP material, and quality control during production and processing, which includes mix design considerations and specification requirements.

For more information on our research projects, or to contact us about our research, please visit our website at www.civil.uwaterloo.ca/CPATT.

Susan Tighe, Director of the Centre for Pavement and Transportation Technology, University of Waterloo

One More Load is an opportunity for people from throughout the Rock to Road industry to discuss an issue that is impacting their business.

If you wish to make a submission for the One More Load column, please email Rock to Road Editor Andrew Macklin at amacklin@annexweb.com.
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