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Pay as you drive?

Electric vehicle push may create need for user-based road fees

Unless you’ve been living on the moon, you’ve likely heard the concerns echoing around the world regarding climate change. With the majority of U.N. member countries signing on to the Paris climate accord, we can expect to see a wide variety of initiatives rolling out in an effort to battle rising temperatures.

One of the ways some countries are tackling the issue is through aggressive pushes for more electric vehicles to reduce CO₂ emissions generated by fossil-fuel-powered vehicles. Recent articles have stated that electric vehicles could be cheaper to produce than fossil-fuel-powered vehicles by as early as 2020. The push by countries to ban the sale of fossil-fuel-powered vehicles will definitely speed up the production and sales of the electric vehicle market – China recently joined France, the U.K. and several other nations up the production and sales of the electric vehicle market – China recently joined France, the U.K. and several other nations stating that it is working with regulators to set a date for the end of sales of fossil-fuel-powered vehicles across the country. While there are definitely significant environmental benefits to reducing the CO₂ emissions generated by gasoline- and diesel-powered vehicles, countries like Canada and the U.S., among others, will be faced with a new challenge: replacing gas tax revenues.

In Canada, the Federal Gas Tax Fund offers a long-term source of funding for municipalities that is used to replace, repair and build infrastructure, which in turn generates big economic benefits to a municipality’s economy including a significant number of good paying construction sector jobs. In 2016, Association of Municipalities Ontario (AMO) administered $617 million for infrastructure projects for municipalities across the province from the Federal Gas Tax Fund. Alberta is set to receive $222 million in 2017-18, and $1.08 billion from 2014-15 to 2018-19. In short, municipalities across the country rely on this fund to aid in their battles against aging infrastructure. So, if people and companies stop paying at the pumps, where does that lost revenue come from?

One option being considered in several countries is a pay-as-you-drive model, where people who own vehicles would be charged an annual fee based on the number of kilometres that they drive. I suspect the formula would end up being more complicated than that in the end, but it is definitely a model being considered to replace lost revenues from fuel taxes.

As much as some people might not agree with this model, the reality is that as fossil-fuel-powered vehicles are removed from the roads, we will need to find a new revenue stream to pay for the construction and maintenance of our roads and bridges. Would this model be effective? That’s the question some counties are currently trying to gauge. Hopefully the powers-that-be can find a solution to lost fuel tax revenues that doesn’t leave our municipalities scrambling or economies reeling. Only time will tell.
Seeing vs. understanding – a common conundrum when it comes to truly understanding challenges. When applied to conveyor operation, “seeing” is most commonly expressed as, “That’s the way we’ve always done it,” or, “This is the way I was taught.” Not necessarily wrong, but perhaps not completely right either.

In contrast, when we have an “understanding” of the events occurring during effective conveyor operation, maximized performance can be achieved. From belt construction, to structural composition to splicing considerations, having fundamental knowledge (or understanding) can provide enhanced belt performance outcomes.
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GETTING TO KNOW YOUR BELT

Belt selection is critical. Knowledge of the workload expected, pulley diameters on the structure, troughability, load support/transverse stiffness, impact loads, and rubber compound requirements are but a few of the prerequisites of choosing the right belt. If this sounds a little overwhelming, be advised that you need not worry; every key belt manufacturer representative can walk you through these parameters.

The bigger issue, especially in the North American market, is the broad brush of belt specifications.

UNDERSTANDING BELT CONSTRUCTION

Key components of a belt include the fabric, skim coats, and adhesions (collectively known as the carcass). This is the backbone of the belt. The carcass does all the work involving carrying the load, cycling from peak to low operational tension, and performance longevity. The other key component is the top and bottom covers. They are there to protect the carcass. Different compounds are available to meet the needs of an application.

The North American market unit of tension is measured in pounds per inch of width (PIW). The plies of fabric, usually made of nylon or polyester, have a rated tension. Common fabric tensions are: 110 lb., 125 lb., 150 lb., and 200 lb. So, adding the number of plies with the rated fabric strength provides the belts rated tension in PIW. For example: three plies of 110 lb. fabric equals a belt rated at 330 PIW. This is the rated tension – a key component in belt selection.

But here’s the issue, and one that is recommended to be resolved. The belt also has a safety factor. The service factor of the carcass is directly proportionate with the safety factor. Higher quality belts will have a 10:1 break strength or higher while lower-end belts can be 6:1 or less. Independent pull tests can verify the break strength.

TRANSITIONS AND YOUR BELT

Now that you know belt construction and conveyor drive system affect performance, what other operational considerations are in play? A prominent part of conveyor design, one for which the conveyor belt is engineered to accommodate, is the transition distance. Located at the load zone, or tail section, and the discharge point, or head section, the transition distance is the dimension from the top of the respective pulley to fully troughed. In other words, the distance from the top of the tail pulley (at the load zone) to the first full troughed idler set (usually 35 degrees or 45 degrees).

Conveyor belts are designed to stretch into these troughed positions while carrying loads. However, meeting or exceeding the recommended distance in this transitioned area is critical to maximizing belt life. Violating this specification will result in premature fatigue. This will be represented in the form of belt cupping (curved belt edges identified on return idlers), wear patterns in top and bottom covers following the load side idler junctions (the space between the flat centre roller and the two canted rollers), and, most damaging, extreme compression folding of the centre of the belt at the transition. All of these preventable events can cause tracking issues, premature splice failure, and will shorten belt life.

There is a relationship between the length of transition distance and the percentage of the belt’s rated tension. This means we need to understand the operating tension of the belt. There are several sophisticated ways to calculate the operational tension; your chosen belt manufacturer can make these available. By knowing the percentage of the belt’s rated tension versus the operational tension, belt performance can be maximized once again. Ideally, operating a belt at 50 per cent to 60 per cent of rated tension is desirable.

One quick check method is referred to as the motor horsepower calculation. This presumes 100 per cent of the horsepower on the nameplate of the motor can be engaged in the drive system. As such, this is a conservative means to calculate operational tension.

### Full Trough Transition Table

<table>
<thead>
<tr>
<th>Idler Angle</th>
<th>% Rated</th>
<th>Belt Width x Factor = Transition Length (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Belt Tension</td>
</tr>
<tr>
<td>20°</td>
<td>Over 90</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>60 to 90</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Less than 60</td>
<td>1.2</td>
</tr>
<tr>
<td>35°</td>
<td>Over 90</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>60 to 90</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Less than 60</td>
<td>1.8</td>
</tr>
<tr>
<td>45°</td>
<td>Over 90</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>60 to 90</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Less than 60</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### Full-Motor Method

\[
\text{PIW} = \frac{33,000 \times (1 + Cw)}{S \times W} \quad \text{Cw = drive “wrap factor” (also called “K factor”)}
\]

Where:

- \( \text{PIW} = \) lbs/in width (max operating tension)
- \( S = \) belt speed (ft/min)
- \( W = \) belt width (inches)
- \( \text{HP} = \) motor horsepower (nameplate)

#### NIBA - Minimum Pulley Diameters

<table>
<thead>
<tr>
<th>Number of Plies</th>
<th>80-100%</th>
<th>60-80%</th>
<th>40-60%</th>
<th>Under 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>24</td>
<td>20</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>24</td>
<td>18</td>
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<td>4</td>
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<td>20</td>
</tr>
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<td>5</td>
<td>42</td>
<td>36</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>48</td>
<td>42</td>
<td>36</td>
<td>30</td>
</tr>
</tbody>
</table>
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OPERATIONAL VS. RATED TENSION

The percentage of operational tension to rated tension affects several key performance characteristics. As mentioned, transition distance recommendation is decreased as the operational percentage is lowered. The same goes with recommended minimum pulley diameters. This includes any pulley in the conveyor system having more than 90 degrees of wrap. The head pulley, tail pulley, and gravity take up pulley are included in this consideration.

On higher percentage operating PIW belts, especially when inclined, the bottom side bend pulley following the gravity take up system may come into play. Like transition distances, the concern lies not in being too big but rather exceeding minimums.

IS YOUR SPLICE RIGHT?

So far, many critical belt performance considerations have been discussed, but how your belt is held together also needs to be considered. There are several options when it comes to splicing your belt, so make sure the right method and correct tools are chosen for the application. Once the method is selected, make certain the splice is installed at a true 90-degree angle to the travel of the belt. This will equalize the tension across the width of the belt, preventing tracking issues once the belt is under tension.

The first consideration in splice choices is vulcanized versus mechanically fastened. Vulcanizing is the process of prep-ping belt ends with either a “step” style splice of a “finger” style splice. The splice kits for both include the rubber material and solutions necessary to prep the belt prior to “cooking” the belt ends in a vulcanizer. Of the two, step splices are more common. However, the finger style splice is preferred in special weave fabric belts and higher tension applications. In both cases, the splicing personnel need to be very skilled to assure the very best outcome. The result is a seamless splice joint with a rubber chemistry most closely matching that of the belt manufacturing process. In ideal circumstances, that splice could last the life of the conveyor belt.

The second option is a mechanical splice joint. The process for installing these utilizes a plate or hinged style design held in compression on the belt ends with either a bolt, rivet, or screw. Mechanical joints meet operational tension needs, are cost effective, and can be installed very quickly by the conveyor operator. Mechanical fasteners, when properly selected, have a very significant life cycle. Another benefit of the mechanical splice is that when it does fatigue, the wear pattern is evident during routine inspection. This makes it easy to add to a planned maintenance on a conveyor.

OTHER BELT PERFORMANCE CONSIDERATIONS

Additional conveyor operation considerations include load zone characteristics and tracking influences. Training for both of these elements can be quite involved. Suffice it to know that the better the product is centered on the receiving belt, the better the chance of keeping the belt tracked. Further, if the product is oriented toward the direction of travel of the receiving belt, at minimum impact, and at similar speed of belt travel, many belt wear issues are minimized. There can be many reasons for belt conveyors to mistrack – structural damage, cambered belt, excessive carryback, over or under tensioned operation – just to name a few. Belts that are not tracking properly will have an adverse effect on performance.

Maximizing conveyor performance can be achieved through an understanding of the performance characteristics of the application. Although there are many reasons why conveyor belt performance may be less than optimal, the solutions are generally common sense once the groundwork is understood. There are also many dependable reference sources to further understand conveyor operations. Two of them would be the conveyors Equipment Manufacturers Association (CEMA, www.cemanet.org) and the National Industrial Belting Association (NIBA, http://niba.org).

Michael Cremeens is the vice-president of training and technical support at Shaw Almex Industries with 39 years of industry experience in a variety of roles ranging from field technician to rubber processing expert. Cremeens has authored numerous papers and speaks at many industry gatherings.

Dick McConnell is the national account/OEM manager at Flexco. His 30 years of troubleshooting conveyor performance in all manner of industries gives him the knowledge and expertise to understand the challenges of both small and large operations, and offer solutions.
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EvoQuip launches Cobra 230 impact crusher

EvoQuip’s Cobra 230 impact crusher is designed for construction and demolition applications including asphalt recycling, quarrying or contract crushing. The rapid set up time and intuitive control system on the Cobra 230 enables the operator to be crushing minutes after unloading the machine. The operator can also adjust the crusher setting without the need for any tools using the user-friendly hydraulic assist that is standard on the machine. As material moves from the feeder through the impactor onto the product belt each section becomes wider ensuring an unrestricted flow. The Cobra 230 uses a fuel efficient and high-performing direct drive system to power the impact crusher. This along with the two independent hydraulic controlled aprons allows the operator to optimize the material throughput and reduction whilst ensuring the best fuel efficiency. With ground level access to the engine, hydraulics, service and refuelling points, the Cobra 230 ensures maintenance is easy for the operator. The crusher’s compact footprint makes it easy to transport and also makes it an ideal machine for working in urban areas.

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Doosan adds G40 mobile generator to product lineup

Doosan Portable Power’s G40WDO mobile generator is rated with a prime power output of 39 kVA. It features a Doosan D24 diesel engine rated at 49 hp and offers many of the same features as the higher-prime output G50, including high-performance alternators for challenging motor-starting applications and precision voltage stability for sensitive applications, including special events.

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Komatsu America introduces WA200-8 wheel loader

Equipped with an EPA Tier 4 Final certified engine, the new WA200-8 wheel loader combines high production with low fuel consumption and improved operator comfort.

Standard features of the new WA200-8 include a powerful 4.46L, 126hp, EPA Tier 4 Final certified, SAA4D107E-3 engine; the Komatsu Diesel Oxidation Catalyst (KDOC), which uses 100 per cent passive regeneration without a diesel particulate filter; the new SCR system for reducing NOx emissions, which is designed to last the life of the engine; fourth generation hydrostatic drivetrain with variable traction control and S-mode for providing excellent traction control to reduce wheel spin (S-mode excels in snowy, icy or slippery conditions). In-cab enhancements and features include a new, more comfortable, high-back, heated seat softens machine vibrations for operator comfort; Pioneering KOMTRAX telematics system and monitor for providing key machine metrics; Komatsu Auto Idle Shutdown; an auxiliary audio jack and two 12-volt ports; a 7” LCD colour monitor with Ecology Guidance; and a dedicated, full-colour, rearview monitor.

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Caterpillar releases new electric drive wheel loader

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- Choosing the right screen media for your operation.
- The latest technologies at the scale to keep hauling operations running smoothly.
- Getting the most out of your telematics data.

WHO SHOULD ATTEND?
Quarry and pit operations managers and owners, process engineers, optimization staff, researchers, design consultants, fleet managers.

REGISTER AT QUARRYTECH.CA
Rock to Road is now accepting presentation proposals for the inaugural Quarry Tech forum. Presentation proposals are currently being accepted for the following topics: telematics, UAVs for aggregate operations, automated vehicles, crushers, conveyors, water conservation, scale solutions, and dust and noise control.

Presentation proposals must be submitted by no later than October 20, 2017.

Speakers selected to present at Quarry Tech will be notified by November 1, 2017.

Any questions regarding presentation proposals can be sent to Rock to Road editor Andrew Snook at asnook@annexweb.com.

LIMITED SPONSORSHIP OPPORTUNITIES ARE AVAILABLE!

Laura Goodwin | National Accounts Manager | 289-928-8543 | lgoodwin@annexweb.com
AGGREGATE PLANTS
a Portable
b Track-Mounted
c Used Machinery
Allis Inc. (m) a
Allu Group (m) a
Amaco Construction Equipment Inc. (d) all
Asphalt Concrete Equipment & Supplies (d) b
Assinck Ltd. (m,d) all
Black Cat Blades, Ltd. (m) a
Bondy Products Inc. (d) a
Boundary Equipment Co. Ltd. (d) c
Clemco Western Ltd. (m,d,c) a
e Crane Rock Drill Ltd. (d) a,c
Dendroff Springs MFG Ltd. (m,c)
Dickson Industrial Insight & Innovation Inc. (D3) (d) a,c
Ecco Corp. (m) all
Eclectic Canada Inc. (m) all
Fiocchi Steel Foundry (m,d) all
Grits Equip. Ltd. (d) all
Kenco Engineering Inc. (m) all
Marcel Power Equipment Inc. (d) c
Mauldin Paving Products (m) all
Mike Staub Equip. Inc. (d) d
PSE Equipment Ltd. (c)
Ritchie Bros. Auctioneers (d) a
Roadtec Inc.
Sanction Equipment Inc (d)
SMS Equipment -Head Office (d)
Strongo (d)
Terrax Roadbuilding (m)
Volvo Construction Equipment (m)
VT Leeboy Inc. (m)
Wirtgen America (m)

ASPHALT PLANT EQUIPMENT
a Dryers
b Milling, etc.
c Vibrating Screens

ASPHALT PLANT PLANT EQUIPMENT

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If you need high open area to hit your production targets, we have more modular options than anyone else. Choose from polyurethane, rubber or our Metaldex™ welded wire product line. Combined with our industry-leading service and support, that's why Polydeck is Your Trusted Screening Resource.

---

**CONVEYOR COMPONENTS**

- **a** Belting
- **b** Fasteners
- **c** Idlers
- **d** Lagging
- **e** Pulleys

---

**Is Open Area The Key...**

To Your Screening Performance?

---

**Performance.**

---

**Guaranteed.**

---

**70% OPTIONS**

> 45% OPEN AREA

---

**ROCKTOROAD | 35**

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**BUYERS GUIDE 2018 | ROCKTOROAD | 35**
Kinecor LP (d) all
Machinery Supply (c) a-d,f-i
Masaba Canada Corp. (m) c-i
Montreal Tracteur Inc. (d) c-f-i
RAD-Power (d) e-f
Rahmnet (m) b
Renold Canada Ltd. (m) c-g,i
Rockwell Automation - Dodge/Reliance (m) all
Scott Screen Co. Ltd. (m) d-f
SM Cyclco Canada (m) g
SMS Equipment - Head Office (d) all
Torspec International Inc. (m) d,i
Tooshont - Toshiba (m,d),d,i
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Weir Canada Inc. (Peacock) (m) a
Weir Minerals Canada (m) a
Weir Minerals North America (m) a

DRYERS
Astec Inc. (m)
Atlas Copco Mining and Rock Excavation Technique Canada (d)
Canadian Equipment Finance & Leasing (c)
Global Resources for Industrial Projects (GRIP) Inc. (d)
Hazenma USA Inc. (m)
Kinecor Engineering Inc. (m)
Kinecor LP (d)
Lefco Equip. Inc. (d)
Machinery Supply (c)
Sullair, LLC (m)
Westpro Machinery Inc. (m)

DUST COLLECTORS/CONTROL
Aggressor Automation (d)
Asphalt Drum Mixers (m)
Assinck Ltd. (m,d)
Astec Inc. (m)
BMH Systems Inc. (m)
BossTrek (m)
Canadian Equipment Finance & Leasing (c)
Diamond Equip. Group Inc. (d)
Flexco (m)
Kinecor LP (d)
Libra Systems Inc. (c)
Machinery Supply (c)
Martin Engineering (m)
Metso Minerals Canada Inc. (m)
NESCO (National Environmental Services) Co. (m)
Norkovich Gravel Ltd. (d)
R. Brunone Canada Inc. (m,d)
Sandvik Mining and Construction (m)
Seaway Marine Transport (m)
Terex Roadbuilding (m)
Tramac Equip. Inc. (m)
Valley Rubber, LLC (m)

ENGINES
a Diesel
b Electric
c Gasoline
Assinck Ltd. (m,d) a
Briggs & Stratton Corp. (m) a,c
Case Construction Equipment (m) all
Cat Paving Products (m) a
Caterpillar Inc. (m) a
Chown Equipment Ltd. (d) a
CIMM Inc. (m) all
Clemco Western Ltd. (m,d,c) a
Cummins Inc. (m) a
Direct Replacement Parts (d) all
Equipments Manuquip Inc. (Les) (d) all
Finning Canada (d) a
Harper Power Products Inc. (d) a
Hatz Diesel of America Inc. (d) a
Hoss Equip. (d) a
Industrial Motor Power Corporation (d) a
International Truck & Engine Corp. (m) a-b
John Deere Construction & Forestry (m) a-b
Kubota Canada Ltd. (m) a
L&M Radiator Inc. / Mesabi (m) a,c
Liebherr - Canada Ltd. (m) a
Machinery Supply (c) b
Masaba Canada Corp. (m) all
Mike Staub Equip. Inc. (d) a
Montreal Tracteur Inc. (d) a
RAD-Power (d) a
Sandvik Mining and Construction (m) a
SMS Equipment - Head Office (d) all
Subaru Industrial Power Products (m) a
Volvo Construction Equipment (m) a

EQUIPMENT ACCESSORIES
Active Scale Manufacturing Inc. (m)
Assinck Ltd. (m,d)

Atelier Gerard Beaulieu (AGB) (m)
Bobcat Company (m)
Calrose Electric Ltd. (m,d)
Canadian Equipment Finance & Leasing (c)
Canadian Hammer Tools (m)
Canadian Mining Suppliers (c)
Cat Paving Products (m)
CCIL - Canadian Council of Independent Laboratories (c)
Chown Equipment Ltd. (d)
Direct Replacement Parts (d)
Emerson Power Transmission Solutions (m)
Godwin Pumps of America Inc. (m)
Great West Equipment (d)
Hapgood Nutritionals Inc. (m)
Hoists Direct (d)
Industrial Motor Power Corporation (d)
Innotag Distributions Inc. (d)
ITT Water & Wastewater (m)
K-Tec Earthmovers Inc. (m)
Komatsu America Corp. (m)
L&M Radiator Inc. / Mesabi (m)

Machinery Supply (c)
Paladin Attachments (m)
Provix (c)
RAD-Power (d)
RMT Equipment Inc. (d)
Rosta Inc. (d)
SMS Equipment - Head Office (d)
Soucy Plastiques Inc (m)
Strongco (d)
Tramec Sloan, LLC (m)
Trans Tech Systems Inc. (m)
Universal Flow Monitors, Inc. (m)
Valley Blades Ltd. (m)
Winkle Industries (m)

EQUIPMENT FINANCE
Active Scale Manufacturing Inc. (m)
Assinck Ltd. (m,d)
Atlas Copco Mining and Rock Excavation Technique Canada (d)
Bobcat Company (m)
Trimele connects people with payload and productivity data across the quarry. Optimize payload and gain total visibility of your costs with LOADRITE productivity management tools. Connect to LOADRITE loader, excavator, conveyor belt scales and the new haul truck monitor.

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**Notes:**
- **D:** Digger/Drill
- **G:** Grader/Groomer
- **P:** Paver
- **R:** Rock Drill/Shotcrete

**TEXAS/CUTTING EDGES, BUCKET & EXCAVATOR**
- Black Cat Blades, Ltd. (m)
- Boundary Equipment Co. Ltd. (d)
- Canadian Equipment Finance & Leasing (c)
- Canadian Hammer Tools (m)
- Case Construction Equipment (m)
- Columbia Steel Casting Co., Inc. (m)
- Creighton Rock Drill Ltd. (d)
- CWS Industries (MFG, Corp. (m)
- Direct Replacement Parts (d)
- Equipment Sales & Services (d)
- Esco Corp. (m)
- Foothills Steel Foundry (m,d)
- Grant Aggregate & Ind. Supply Inc. (d)
- Great West Equipment (d)
- GroundMAX LTD. (d)
- John Deer Construction & Forestry (m)
- Kenco Engineering Inc. (m)
- Kennametal Inc. (m)
- Liebherr - Canada Ltd. (m)
- Mike Staub Equip. Inc. (d)
- Montreal Tracteur Inc. (d)
- Presto G F Sales & Service Ltd. (d)
- Scott Screen Co. Ltd. (m)
- SMS Equipment -Head Office (d)
- Strongco (d)
- Terraformer Equipment Sales & Rentals Inc. (d)
- Tracks & Wheels Equipment Brokers Inc. (d)
- Valley Blades Ltd. (m)
- Volvo Construction Equipment (m)
- Wajax Equipment (d)

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TESTING SIEVES & SIEVE SHAKERS
Bondyn Products Inc. (d) Chambers & Cooke Ltd. (d) Geneg Inc. (d) Gilson Co., Inc. (m,d) Haver & Boeckler (m) M&L Testing Equip. (1995) Inc. (d) McLain Testing Equipment LTD (d) National Trailer Mfg. Ltd. (m) Scott Screen Co. Ltd. (m) Wipware Inc. (m)

TIREs, ON/OFF ROAD
Bridgestone/Firestone Oftr (m) Canadian Equipment Finance & Leasing (c) Caterpillar Inc. (m) Continental Tire (m) Direct Replacement Parts (d) Great West Equipment (d) GroundMAX LTD. (d) Michelin North America (Canada) Inc. (m) Strongco (d)

TRACTORS
a Attachments b Crawler c Wheel
Accutracrics Hydraulic Tools & Attachments (d) a Allmand Bros. Inc. (m) c Amaco Construction Equipment Inc. (d) a Bobcat Company (m) a,c C&P Attachments/ JRC Attachments (m) a Case Construction Equipment (m) b Caterpillar Inc. (m) all Chown Equipment Ltd. (d) all Direct Replacement Parts (d) all Eisco Corp. (m) a Finning Canada (d) c Great West Equipment (d) all Host Equip. (d) all J.A. Larue Inc. (m) a John Deere Construction & Forestry (m) a,b K-Tec Earthmovers Inc. (m) a Komatsu America Corp. (m,b) Komatsu Canada Ltd. (m) all Kubota Canada Ltd. (m,c) a Marcel Equipment Limited (d) a,b Rockland MFG. Co. (m) a,c SMS Equipment -Head Office (d) all Tracks & Wheels Equipment Brokers Inc. (d) a,c

TRAILERS, FLOATS & LOWBEDS
Atelier Gerard Beaulieu (AGB) (m) Beau-Roc Inc. (m) Caldwell Construction Inc. (m) Canadian Equipment Finance & Leasing (c) Glavsan Great Dane (Alliston) (d) Glavsan Great Dane (Mississauga) (d) Glavsan Great Dane (Whitby) (d) Host Equip. (d) Mike Staud Equip. Inc. (d) Ninkovich Gravel Ltd. (d) Talbert Manufacturing Inc. (m) Titan Trailers (m) Trail - Eze Trailers (m)

W.K. Dahms MFG. Ltd. (m) TRANSPORTATION & SHIPPING (AGGREGATES)
Caldwell Construction Inc. (m) Canada Steamship Lines (m) Canadian Equipment Finance & Leasing (c) Command Alkon (c) Five/Cubits, a Command Alkon Company (c) Ninkovich Gravel Ltd. (d) Rotobec (m) Seaway Marine Transport (m) TRUCKS, OFF-ROAD
Agginm Equip. Ltd. (d) Canadian Equipment Finance & Leasing (c) Case Construction Equipment (m) Caterpillar Inc. (m) Dossan Infracore Construction Equipment America (m) FreighterTrucks (m) Hitachi Const. & Mining Co. (m) Host Equip. (d) International Truck & Engine Corp. (m) JCB Inc. (m) John Deere Construction & Forestry (m) Kenworth Truck Co. (m) Komatsu America Corp. (m) Komatsu Canada Ltd. (m) Liebertt - Canada Ltd. (m) Marcel Equipment Limited (d) McCoy Trucks of America LLC (m) Peterbilt Motors Co. (m) SMS Equipment -Head Office (d) SMS Rents / Location SMS (d) Sterling Trucks Corp. (m) Strongco (d) Terex Construction Americas (m) Terex Trucks (m) Tracks & Wheels Equipment Brokers Inc. (d) Volvo Construction Equipment (m) W.K. Dahms MFG. Ltd. (m) Wajax Equipment (d) Western Star Trucks (m) TRUCKS, ON-ROAD
Agginm Equip. Ltd. (d) Canadian Equipment Finance & Leasing (c) FreighterTrucks (m) Great West Equipment (d) International Truck & Engine Corp. (m) Kenworth Truck Co. (m) Mack Trucks Canada Ltd. (m) Mack Trucks Inc. (m) Ninkovich Gravel Ltd. (d) Peterbilt Motors Co. (m) SMS Equipment -Head Office (d) Sterling Trucks Corp. (m) Volvo Trucks Canada Inc. (m) Western Star Trucks (m) Winslow-Gerolamy Motors Ltd. (d) TRUCKS, TRANSMISSIONS
Allison Transmission Inc. (m) Canadian Equipment Finance & Leasing (c) Caterpillar Inc. (m) Harper Power Products Inc. (d) Mack Trucks Inc. (m) Montreal Tracteur Inc. (d) SMS Equipment -Head Office (d) Volvo Trucks Canada Inc. (m) UAVS / DRONES
Kespy (m) VIBRATORS
a Bins b Concrete c Hoppers
Allen Engineering Corporation (m) b BMH Systems Inc. (m) b CMI Inc. (m) all Clemco Western Ltd. (m,d,c) a Dickson Industrial Insight & Innovation Inc. (D3) (d) a,c Edge Innovate (m) c ELRUS Aggregate Systems (d) all Equipments Manuquip Inc. (Lesi) (d) all Eniez (m) a General Bearing Service Inc. (d) all Gerquip Inc. (d) all Gets Equip. Ltd. (d) all Gilson Co., Inc. (m,d) b Global Resources for Industrial Projects (GRIP) Inc. (d) a,c Grant Aggregate & Ind. Supply Inc. (d) all Great West Equipment (d) all Hikon Ind. Ltd. (m,d) a Ingersoll-Rand (m) b Innogat Distributions Inc. (d) a M&L Testing Equipment LTD (d) b Machinery Supply (c) a,c Martin Engineering (m) all Masaba Canada Corp. (m) a,c Midwestern Industries Inc. (m) a,m Pumpaction Inc. (m) b Renold Canada Ltd. (m,a) Rusta Inc. (d) all Scale-Tron Inc. (m) a,b Strongco (d) all Terex Roadbuilding (m) a Wacker Neuson (m) b Weir Minerals Canada (m) a,c Weir Minerals North America (m) a,c WRT Equipment Ltd. (c) a,c WASHING PLANTS
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HY15 Conveyor Belt Scale

HY15 Conveyor Belt Scale

WESTPRO Machinery Inc. (m)

WP10 Weigh Belt Feeder

WP10 Weigh Belt Feeder

WP10 Weigh Belt Feeder
Most quarry or aggregate operations include some type of crushing machine or functions. By definition, crushers are used to reduce large rocks into smaller rocks or rock dust, depending on the requirement of the operation and material being crushed. The actual crusher can be in the form of a cone, gyratory, impact, jaw, etc. – type machine. Common to all crushers is the requirement for lubrication, be it oil lubrication (e.g. for gear boxes) or grease (e.g. for bearings). The pure nature of crushing rocks produces many possible issues and considerations to tend with on a daily basis.

Keeping crushing equipment running productively

> Most quarry or aggregate operations include some type of crushing machine or functions. By definition, crushers are used to reduce large rocks into smaller rocks or rock dust, depending on the requirement of the operation and material being crushed. The actual crusher can be in the form of a cone, gyratory, impact, jaw, etc. – type machine. Common to all crushers is the requirement for lubrication, be it oil lubrication (e.g. for gear boxes) or grease (e.g. for bearings). The pure nature of crushing rocks produces many possible issues and considerations to tend with on a daily basis.
For crusher systems that use oil lubrication for example, contamination of oil is a common issue and a fact of life. One solution is to use a circulating oil lubrication system (CircOil) to remove contaminants or "condition" the oil, to optimize the lubrication and maintenance of the crusher. In contrast to total loss lubrication systems (where lubricant is not collected after it is applied to the lube point), in a CircOil System, after the oil passes through the lubrication point, it is collected, conditioned and reused. In addition to lubricating and filtering out wear particles from friction points, CircOil systems also help maintain the lubrication points at a proper temperature, prevent corrosion, and remove water condensation.

CircOil systems can include a wide range of tailor-made and turnkey solutions for flow rates from 0.1 to 3,000 l/min. Oil stored in the oil supply unit is continuously pumped out and separated by hydraulic resistors (orifice tubes, adjustable metering valve distributors, throttles, etc.), flow limiters or progressive feeders, or multi-circuit pumps (multi-circuit gear pumps or multi-circuit piston pumps with one pump each per lube point). The right amount of oil is distributed to the lubrication points. The actual feed rates can be controlled visually or electronically. Monitoring systems with individual warning levels are also available for a more predictive maintenance approach. Once it’s passed through the lubrication points, oil containing particles, air and water is fed back through a return line into the oil supply unit where it is reconditioned and reused.

**BENEFITS**

- Efficient cooling and lubrication
- Removal of particles
- Removal of air, condensation and process water
- Integrated condition monitoring
- Demand-based distribution of lubricant which can be monitored

In some special oil lubrication cases such as extreme heat applications, additional lubricant filtration or conditioning is required and can be achieved using oil conditioning units. These are low-volume off-loop or kidney loop systems, installed directly onto existing CircOil systems. A unit provides continuous oil filtration to remove contamination and usually includes a cooler to maintain the operating temperature of lubricating oil, protecting the machinery from unexpected failures by protecting the lubricant and extending its useful service life. Oil conditioning units are used effectively in many applications such as large bearing housings, compressors, and gearboxes. They can be retrofitted on machinery where the existing conditioning is not satisfactory or does not exist.

Other lubrication considerations in quarries include crushers with bearings that need to be greased, such as the shaft bearings in jaw-type crushers. The majority of these bearings are manually lubricated. Some have remote grease lines, allowing maintenance personnel to grease safely from a distance. In many cases, an automatic lubrication system (ALS) is a good alternative in this type of application.

ALS was discussed extensively in the July/August 2017 issue of Rock-to-Road, but in general, the biggest benefit of installing a proper ALS is the bearings will be receiving grease while the machine is in operation and will result in more even grease film thickness/coverage; consistent grease wedge developed around the bearing; lower power consumption and smoother machine operation; reduction of high impact due to the operation of the crusher; and safety for maintenance and operating personnel.

Other crushers employ single point automatic lubricators (SPALs) for their bearing lubrication (also referred to as drip feed lubricators or drip greasers). SPALs are typically used for lubrication points that are located in hard-to-get locations. These points could be manually lubricated, but often, due to their location, with limited success. In some cases, there are potential safety issues in getting a technician to the location to lubricate. The end result is a lack of confidence the lubrication schedule is being maintained. Whether or not the right amount of lubricant is consistently being delivered becomes another on-going source of concern.

SPALs are a relatively inexpensive solution to these issues. Simply install the lubricator either directly on the bearing or through a remote line, set the timer as applicable and record the scheduled time for replacement of the unit.

SPALs are available in a wide range of configurations. The correct solution for a specific application will depend upon environmental conditions; location of the single point lubricator in relation to the lubrication point; how long between replenishment; and physical space available at the lube point.

At the end of the day, normal operations within a quarry will have some effect on either the oil or grease lubrication. Maintaining the lubricant through proper conditioning will extend the lubricant life. This, along with implementation of best lubrication practices and systems such as the automatic greasing systems on key bearings or the single point automatic lubricators on difficult to reach bearings will show benefits with increased uptime and longer machine life.
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