Atlantic Concrete Association • Association béton Atlantique

READY MIX NEWS

Cannabis rules 3

3D concrete 8

Climate change 11

Spring/Summer • Vol. 28 | No. 1

Knowing the difference

Amy Amirault draws on her Parker family heritage to craft award-winning science fair project

By Amanda Jess

Murray Parker's influence in tilt-up construction is visible throughout Atlantic Canada, but buildings aren't the only place his legacy can be felt.

As Amy Amirault recently accepted her gold medal and Best Discovery Project award at the Annapolis Valley Regional Science Fair, she wore Parker's ring around her neck to have a piece of her grandfather with her.

"It's just been kinda good luck for me. It's something to remember him from," Amy says.

The West Hants Middle School grade seven student was inspired by her grandfather and her mother Erin, a project manager with B.D. Stevens, to explore the difference between cement and concrete in her project.

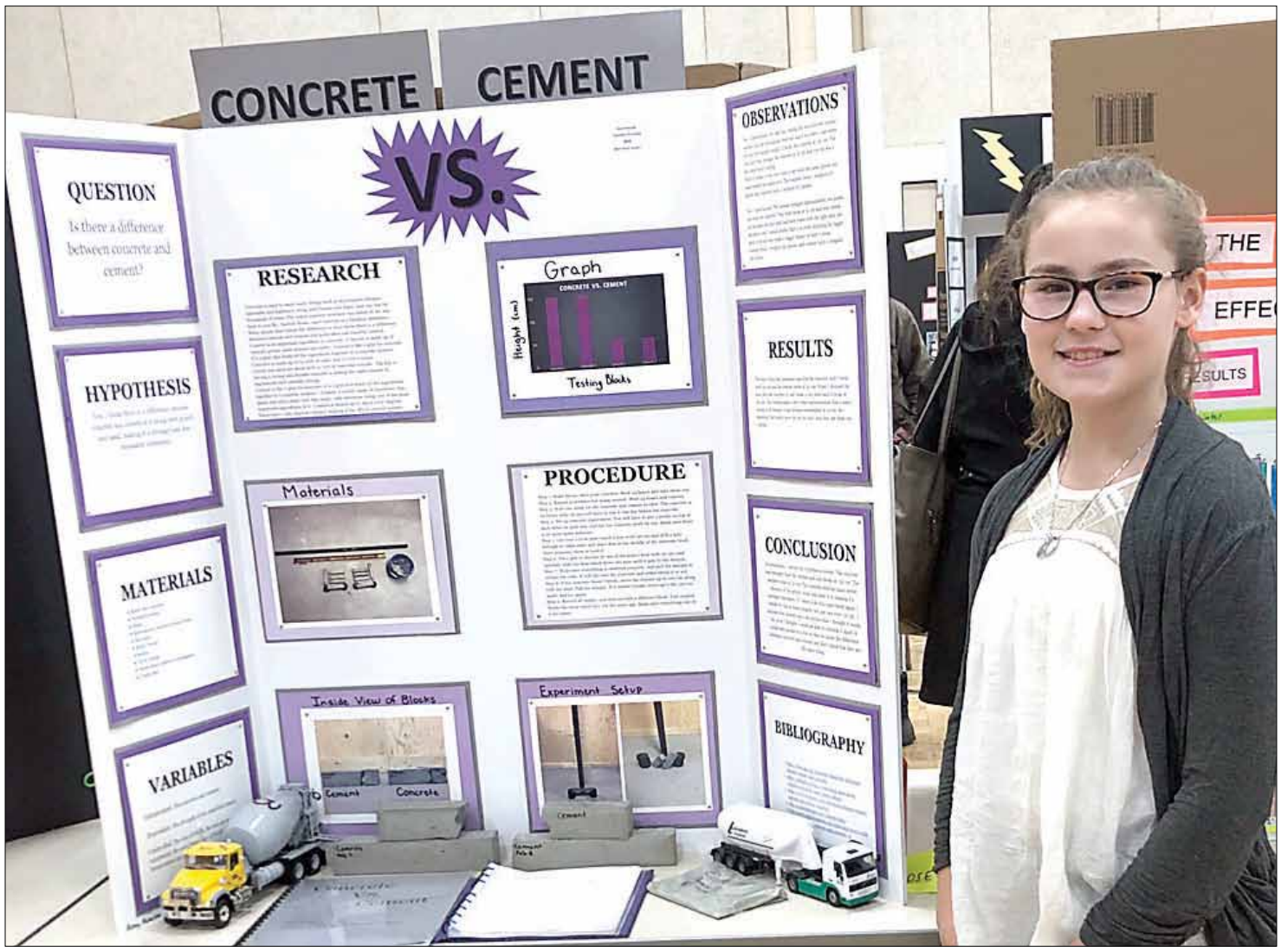
"We kinda brainstormed this idea because mom's an engineer and she knows so much about concrete, so I thought it would be a good reference."

Erin says she has always cringed when she hears anybody call concrete cement and her daughters have always known the difference.

Amy's experiment required making concrete and cement blocks and bringing weight down on each material to test the durability, with concrete proving to be stronger.

"It definitely gave you a bit of an understanding about the way building materials go together, too," Erin says to Amy during an interview, adding they had to use different forms for pouring the concrete. "She now understands the curing process of concrete, that it's not just something that dries, that it cures."

The project has made Amy consider civil engineering as a possible career path. She had previously been adamant she wasn't interested in construction, Erin says, but the fun she had completing the project made Amy rethink her stance.



Amy Amirault shows off her entry into the Annapolis Valley Regional Science Fair, which earned her a gold medal and the Best Discovery Project award.

Though Erin helped Amy during the experiment process, Amy worked on the presentation part alone.

"I was really proud of her and again, because I had stepped back after we did the experiment, she did pull off the whole presentation herself and that meant she had to understand a lot about concrete and be able to explain it well."

Like Amy, Erin's introduction to concrete started at a young age.

Continued on page 2

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Amy Amirault wore her grandfather Murray Parker's ring around her neck for good luck during her competition in the Annapolis Valley Regional Science Fair. If that Best Discovery Project award in her hands is any indication, it must have worked.

Knowing the difference

Continued from page 1

Erin says she was about four or five-years-old when Parker first started working in tilt-up construction. She visited his work as a child, did clean-up jobs as a teenager, and attended conventions with him when she was in university.

"I always loved the smell of concrete. It was all I really knew," she says, adding her mother was a financial advisor and that line of work never interested her. Instead, she preferred the excitement of job sites.

After graduating from engineering at Dalhousie University in May 2000, Parker drove her to North Carolina to start her first job in the industry, a few weeks before he died.

"He was always looking for a better way, a better solution. And I mean, you can see it all throughout Burnside now. There are so many tilt-up buildings because it's a great solution for what people need in warehouses in this area. Every time you watched him do something, he was always looking to improve, find a better way."

His commitment to the industry prompted the creation of an award in his name at the Tilt-up Concrete Association, which is given to a person who has helped to grow the industry.

"As General Manager/Vice President of B.D. Stevens Ltd. in Dartmouth, Nova Scotia, Parker is credited with introducing tilt-up to an area of the world where many thought it impossible to use the medium. His contributions and commitment to excellence helped the method gain credibility in the area and paved the way for future tilt-up projects," the association says in the award description.

Where they live in the Windsor area, Erin's children are able to point out which buildings came from Parker. Though they never got to meet, his impact is clear.

Amy Amirault and her mother Erin are pictured with Amy's awards from the Annapolis Valley Regional Science Fair, earned from her project exploring the difference between cement and concrete.

Cannabis in the workplace

Balancing human rights with safety is the area of greatest interest

By Chris Benjamin

At this year's ConAtlantic in Halifax on Feb. 22, Sonya Tonkovich of the Canadian Centre for Occupational Health & Safety, Tanya Sieliakus of HR Pros, Ian Brown of the Boyne Clarke law firm, and Steve Bates of Stanhope Simpson Insurance, took part in a plenary session where they took questions from a moderator and the audience on the topic of "Cannabis in the Workplace."

Questions were suited to the expertise of the panel, but the discussion honed in on a particular topic: how can employers balance their responsibility to provide a safe (ideally, drug-free) workplace with their employees' rights to privacy and to have their health needs accommodated?

The experts seemed to agree the legalization of cannabis hasn't changed things all that much. Employers have the same responsibilities. Employees have the same rights. And the legalization of cannabis most certainly does not give employees the right to be high at work, any more than they're allowed to be drunk at work.

"From an insurance perspective," Bates said, "any impairment… is only going to cause more expensive problems for your business." Besides alcohol and drugs, impairment could also be from fatigue or other factors.

Tension arises from key facts that are difficult to reconcile: some employees rely on legal medical cannabis as treatment for chronic conditions, and employers often want zero-tolerance workplaces due to safety concerns, and wish to test their employees for drug use, sometimes randomly.

DRUG TESTING

The subject of testing sparked the most questions from the audience. Brown, speaking from a legal perspective, gave a clear answer: testing, particularly taking random blood and urine samples, is allowed "only in very narrow instances." First, the employee must have a specific, high-risk role with your company. Second, the employee must have a history of drug abuse while working for you.

One audience member said his company drug tests potential employees before hiring them. Brown warned this opened them to possible discrimination claims.

"You have to clearly tie expectations of safety to the drug test."

Tonkovich said that it's possible to test positive with levels of THC, the chemical responsible for much of cannabis's impairing effects, that are too low to impact job safety. This especially applies to medical cannabis users.

From a human resources perspective, Sieliakus provided numerous anecdotes of employers who failed to convince courts in Canada they had a right to randomly test employees in certain circumstances. Drug abuse with previous employers was one example.

She also noted "there is no such thing as zero tolerance… human rights legislation trumps zero tolerance." In other words, human rights are strong enough in Canada that employers can't use safety concerns to justify privacy violations.

Bates, from an insurance perspective, said that indiscriminate drug testing could lead to liability claims by employees.

RISK OF INJURY

Given that random drug testing is a dicey proposition, the employers present wanted to know what their legal responsibilities were to employees who were injured while working impaired. Here, Brown noted that impairment can be difficult to prove, but if an employer has suspicions, the employee must be removed from the site. The safest option, from a liability perspective, is to send them home for the day with pay and have frank discussions with them about the concerns as soon as possible.

Sieliakus told of an incident in Halifax where an employee was injured, then failed a drug and alcohol test. The investigation showed that "it was a well-known unknown" that the employee was an alcoholic; their worker's compensation claim was successful and became a long-term financial liability for the company.

"You can't just turn around and ignore it anymore," she said. "We have a social obligation as employers… you have to put resources to problems."

ConAtlantic 2019 featured a plenary session on the effects of legalized and medical cannabis on the workplace. Panel members included Sonya Tonkovich of the Canadian Centre for Occupational Health & Safety (not shown), Tanya Sieliakus of HR Pros, Ian Brown of the Boyne Clarke law firm (centre), and Steve Bates of Stanhope Simpson Insurance.

For example, the company could have intervened earlier and paid for the employee to undergo addictions treatment.

Brown pointed out "the employer is not entitled to [make] a diagnosis." However, they can ask questions and should document the answers.

MEDICAL CANNABIS USE

Regarding the need to accommodate disability and accompanying use of medical cannabis, the panelists noted the employee also has the responsibility to prove the treatment is necessary.

"You need some evidence from the doctor," Brown said. "Accommodation is a two-way street."

Employers also need to assess whether the employee's duties can be properly, and safely, completed while using medical cannabis. Sieliakus was blunt in her assessment of the challenges of having doctors assess the appropriateness of using medical cannabis in an industrial workplace.

"Doctors have no two clues about industrial environments."

Her firm makes use of "Request for Accommodation" forms that provide doctors with detailed descriptions of the workplace, its hazards and conditions, and the nature of the work, complete with visual aids.

Ultimately, she says, if she's not completely satisfied an employee can safely conduct their duties while using medical cannabis, she'll accommodate them in other ways.

"Maybe I have to put them in an office, shorten their shift, reduce their duties."

Write a comprehensive policy

Tonkovich focused on the crucial need for employers to write comprehensive, informed policy, in order to prevent the worst-case scenarios.

"The use of cannabis is a risk like any other," she said, "and requires planning. Determine the hazards, assess the risk, control the risk. Have a policy and plan in place, communicate it, provide training."

Part of that process should be determining which jobs in your workplace are safety-sensitive. Who would most likely increase the risk of injury or damage due to impairment of any kind?

Finally, she recommended unionized workplaces develop the policy in cooperation with the union for better employee buy-in.

ConAtlantic 2019

Casino Night was a popular draw at ConAtlantic 2019.

The 2019 Errol Praught Hockey Tournament, held as part of ConAtlantic, had one of its best turn-outs ever.

Artistic expression was on the spousal program menu for ConAtlantic 2019. Check out the results of Paint Night.

All the seats were full at the blackjack table.

Scott Flemming accepts the Errol Praught Hockey Tournament trophy for the winning team.

ConAtlantic 2019

Karla Brown of Casey Concrete looks on as she prepares to say goodbye to the $100 she handed Michael James.

Kevin Nickerson of Quality Concrete took over as the new president of the Atlantic Concrete Association at the 2019 ConAtlantic event.

Magician Michael James pulls needles out of his mouth during perhaps the least appetizing part of the President's Dinner.

The featured entertainer for this year's ConAtlantic President's Dinner was magician Michael James (centre). Valerie Owen (left) and David Bancroft of OSCO joined him on stage to try and seperate the magic rings.

It would appear James was the more successful of the three. Owen's and Bancroft's rings still look very much attached.

This hand is just getting started.

ConAtlantic 2019

ConAtlantic 2019 included a visit to the Timber Lounge, because what goes together better than concrete and axes? Three of the usual suspects included ACA board member Shawn Mills, ACA Executive Director Pam Woodman, and ACA Past President Jamie Reid.

ACA made a donation of $500 to the IWK Foundation instead of presenting speaker gifts at the 2019 ConAtlantic.

Photographic evidence Pam, Jamie, Shawn, and Randy were not the only ones having fun at the Timber Lounge. They had lots of chaperones.

Randy Nason was the winner in the ax throwing competition. He wears the sash well, don't you think?

'Employees need rules, and rules must be written'

Companies need to have their own policies tailored to support their business goals

By Amanda Jess

Tanya Sieliakus, managing partner and vice-president of consulting services at HR Pros (shown here with the mic), encourages all companies to put their personnel policies in writing before they run into any difficulties instead of waiting till after a complaint has already been filed.

A lot of human resource policies are unclear and sometimes infringe on employees' rights, according to the managing partner of HR Pros.

Tanya Sieliakus, who is also the vice president of consulting services at the Halifax-based company, was recently on a panel at ConAtlantic that addressed the impacts of medical marijuana and legalized recreational cannabis on the workplace.

"Specifically, employers are obligated to accommodate medical marijuana to the point of undue hardship. However, recreational marijuana, though legal, is treated no differently in the workplace than an employee using alcohol, for example," she says.

Sieliakus says a lot of policies use the words "zero tolerance," which doesn't acknowledge the use of drugs for medical purposes nor the possibility of addiction. If an employee identifies they have a disability, the employer is required to accommodate them, Sieliakus says.

That's one issue, she says, adding that overall, she finds many policies to be poorly written. Many employers, especially smaller companies, don't have any policy in place at all.

"They somehow believe personnel policies infringe upon their ability to deal with their employees on a one-on-one basis," Sieliakus says . "Employees are adults. Most adults come to work every day wanting to be good employees, but how can an adult employee be a good employee if they do not know the 'rules' of the workplace? Employees need rules, and rules must be written."

Another issue she sees is some companies don't have policies specific to them, borrowing from other workplaces or the Internet.

"Policies should be specific to a company because policies should support the objectives of the company, not the objectives of another company. Further, most of what is on the Internet is from out of country and/or out of province," she says, adding each province is subject to its own labour laws.

While she likes her clients to be self-sufficient, she doesn't encourage them to write policy themselves. There are two options: hiring a consultant like herself or hiring a labour lawyer. Both are more versed in labour and human rights laws as well as precedent set in court.

She says employees are guaranteed rights under law and policies can't infringe on that.

"Unfortunately, too often HR Pros is called upon to assist an employer after a complaint is made by a former employee with either the Department of Labour or the Human Rights Commissions. Termination, disability leave, and management, and pay practices, [such as] holiday pay, overtime, vacation pay, are the most prevalent sources of contention in our experience."

The rise of 3D concrete printing

By Sika Canada

All industries are experimenting major revolutions, from where mass production started, to the use of computers and automation and now with the last industrial revolution, which gives the possibility to predict failures, improve the maintenance processes, and the logistics that interact with production.

However, none of these industrial revolutions have been successfully implemented in the construction field, mainly due to the low cost of construction materials and the difficulty automatizing the processes. Any innovative technology could be viewed as an additional cost on one hand, and on the other hand the current products used aren't suitable for automation.

The construction industry is known to be conservative where only small incremental improvements are reached over the long term. Consequently, the field is now suffering a lack of productivity and most of the companies involved in the construction field are suffering from low profit. A recent article in the economist[1] highlights the continuous decrease of branch productivity in the last 60 years in North America. At the same time labour requirements are increasing with higher specifications in terms of energy consumption, acoustics, and architecture.

Instead of modernizing construction technologies, the market is polarized between reducing product prices and controlling labour costs, which are increasing all around the world. The battle of labour versus material costs has an inverse impact, leading to multiplication of construction mistakes, communications issues, and non-sustainable building. On the other hand, the optimization of the processes, with the use of smart materials leads to a reduction of mistakes with faster construction times at a lower cost.

Dr. Didier Lootens and his team with an acoustic wall printed in the 3D Technology Center of Sika.

3D Printing is one of the cutting-edge technologies bringing huge possibilities to the concept of complex designs, but also to the functionality of materials. Initially limited to the conception of prototypes, 3D printing (also called additive manufacturing) is now used in such fields as automobiles, aeronautics, consumer products, medical, architecture, and even food. However, it has a slower implementation in the construction field mainly due to the large scales involved and the complexity of the physics and chemistry of the cost-effective materials used.

Chemistry, process and civil engineering, and architecture need to be combined to achieve a successful and rapid implementation of environmental materials for 3D printing. Whereas significant improvements in large robotics has been observed the last few years, the design of the "ink" is still presenting huge challenges as the material needs to follow seemingly contradictory requirements:

1. The material is pumped from a reservoir to the printing head and extruded through a nozzle, so it needs to be fluid enough to do this, but not be subject to segregation, neither during flow nor under gravity;
2. Once deposited, the material shouldn't flow under its own weight;
3. The cementitious material deposited should adhere to the previous deposited layers;
4. A given layer should be able to support subsequent upper layers; and
5. The surface should be regular with reduced volume change to avoid any cracks.

Such properties as rheology, shrinkage, and strength should be perfectly controlled. All these properties can now be well-controlled thanks to the development of new 3D printable concrete, also called ink.

3D printing and its construction materials are still a small piece of the market, but its potential is huge. The huge of related academic and industrial activities is evidence of this[2, 3, 4, 5]. The success of the technology implementation will be driven by the combination of multidisciplinary subjects that require a broad range of knowledge in:

1. Electronics
2. Mechanics and robotics
3. Physics and chemistry
4. Formulations
5. Architecture and structural engineering.

In the last two years, significant improvements were observed in the precast industry, including the direct print of a house on-site. However, the precast industry should be the first to implement this technology as the safety requirements on the job site are still a major limitation on the implementation of collaborative robots.

The use of gantry robot printers has the advantage of allowing the construction of large elements, up to 20m, and offers the capacity of large production with large printing surfaces reaching 100m2. The horizontal speed of the gantry can also easily reach 1m/s where the vertical building speed can reach 20cm/min. With a maximum flow of 2t/h, an acoustic wall (see photograph) could be printed in less than one hour. Print speed is reached without compromising the quality of layer precision below one millimeter, as required in construction.

The implementation of large-scale 3D printing of construction materials is a complex field that can be only solved with specialists who have a broad knowledge of not only the construction material chemistry and physics, but also of processes and programming. However, the complexities of additive manufacturing of concrete will not only rely on robotics or materials, but rather on architecture and building functionalities. The collaboration between architects and scientists will be key to the success of the needed transition to Construction 4.0.

References:

[1] www.economist.com/business/2017/08/17/efficiency-eludes-the-construction-industry

[2] Ma G. and Wang L. "A critical review of preparation design and workability measurement of concrete material for large-scale 3D printing". Frontiers of Structural and Civil Engineering, Vol. 12, Issue 3, pp. 382-400, 2018.

[3] Suvash Chandra Paul, Gideon P.A.G. van Zijl, Ming Jen Tan and Ian Gibson. "A review of 3D concrete printing systems and materials properties: current status and future research prospects", Rapid Prototyping Journal, Vol. 24 Issue 4, pp.784-798, 2018.

[4] Panda B., Tay Y.W.D., Paul S.C., Tan M.J. "Current challenges and future potential of 3D concrete printing". Materialwiss. Werkstofftech, Vol. 49, pp. 666-673, 2018.

[5] Jones S.Z., Bentz D.P., Martys N.S., George W.L., Thomas A., "Rheological Control of 3D Printable Cement Paste and Mortars", International Conference on Concrete and Digital Fabrication – Digital Concrete pp 70-80, 2018.

Online CDP launch a success

New digital training option embraced, recognized by Construction Safety Association of Nova Scotia

By Ken Partridge

The official launch of the Atlantic Concrete Association's online Concrete Delivery Professional (CDP) certification program is a success and already attracting attention from across the industry.

The intent of the online alternative was to overcome many of the drawbacks of traditional delivery methods, which usually involved gathering trainees in a specific location for day-long, in-person sessions. This placed an increased burden on smaller operations, especially those located in more remote communities.

The new digital version eliminates the need to travel, is more cost effective, and saves ACA members time and money.

"This is something the industry needed in this format," says Jamie Reid, past president of the ACA. "It's advantageous for members all across the region, no matter how remote."

The quality of the new experience has also attracted attention from outside the concrete industry. The Construction Safety Association of Nova Scotia recent informed the ACA it has been recognized for its innovative approach.

"The successful launch of our online CDP program is a testament to the hard work of everyone at the ACA, and the skill of our partners in this project, Pixelyard. We are extremely proud to be able to offer our members this excellent remote learning tool. We're also humbled that others see its importance, as demonstrated by the recent announcement of its recognition by the Construction Safety Association of Nova Scotia," says Quality Concrete's Kevin Nickerson, the newly appointed president of the ACA.

The Atlantic Concrete Association has won the Leadership Award from the Construction Safety Association of Nova Scotia for its work on the new Certification Driver Professional online course. Pam Woodman, executive director of the ACA, says it was the great work of ACA's dedicated volunteers who were responsible for the win. Pictured accepting the award is: (left to right) Andrew Holley of the Construction Safety Association of Nova Scotia and Nova Scotia Home Builders Association; Pam Woodman, executive director of the ACA; and Kent Nickerson, past president of the Construction Safety Association of Nova Scotia and a member of the ACA's board.

Up to now, remote delivery of the program was hampered by the need for hands-on skill acquisition. That's why the ACA approached Pixelyard in Bedford, Nova Scotia. The company specializes in developing custom instructional solutions and curriculum for trades and technical training organizations. Pixelyard's use of high-fidelity 3D models and simulations create 'virtual' tools and equipment that overcome the need for trainees to physically manipulate actual tools, but still gives them the experience and repetition required to acquire the requisite skills.

"We've been doing this for quite some time," says Pixelyard's Peter Moak. "We're comfortable taking technical training and putting it online. We put lots of interactivity into it and bring the process alive. Taking a classroom course and converting it to online can be daunting for an association, but it's the kind of thing we've been working with such groups to accomplish for a long time."

Casey Concrete's Karla Brown, chair of the ACA's education committee that oversaw development, says, "The ACA board was looking for an efficient and cost-effective way for all members to access the CDP Certification. Providing this delivery allows more of our drivers to get valuable professional training without having to miss time or travel to do so. The committee is excited to be offering the industry a new, innovative, and interactive approach to CDP certification and training. Having it available online as opposed to the traditional classroom training opens up accessibility for all members."

Training well worth the cost

Lower productivity, employee loyalty can result from not investing in proper training programs

You have an employee that isn't performing well. You believe they have greater potential, but they aren't delivering. You have two options: fire them and start over with a new hire, or invest in them with some targeted training.

The latter of those two options is your better choice. Here are five reasons why that's true

1.) There is a direct correlation between happy employees and a successful business. Members of workforce believe in the value of training and advancement. They're aware of how competitive the work world is and appreciate training opportunities that help them stay ahead of the curve. Conversely, untrained employees are unhappy and believe they're underutilized. This makes them frustrated and less loyal. They make more mistakes and fail to meet standards. The assumption training only leads to employees moving on simply isn't true. Proper training makes employees feel valued and happier. A job with training also attracts a higher class of candidate. Training also helps in short-term ways by helping employees be more efficient. A trained employee can answer questions from the public without having to go to a manager, has a greater understanding of the job, is more efficient work, and gets along with management.

2.) While it may seem simple just to replace one worker with another, consider this: hiring someone can cost up to 30 per cent of the job's salary. That means for an employee making $40,000 a year the cost could be around $12,000 to hire someone new. However, training an existing employee might only cost a few hundred and take far less time. Consider that for every three employees that need to be replaced, the cost is equal to an entire salary. Training and recruitment costs are far more than training an existing employee if you factor in the time and money it takes to hire plus time spent as a new employee acclimates to the company. Rehiring costs represent around 12 per cent of a company's expenses with up to 40 per cent for businesses that have a high turnover rate. These stats prove turnover is costly. A study conducted by Right Management also confirmed this, as nearly 70 per cent of organizations say that staff turnover has a negative financial impact due to the cost of recruiting, hiring, and training a replacement employee and the overtime work of current employees that's required until the organization can fill the vacant position.

3.) When workers perform poorly, it reflects badly on the business and affects the bottom line. A high turnover rate with dozens or hundreds of employees making the same mistakes means the true problems lie with the training provided, not the employees. Proper training makes workers better capable of doing their jobs, reducing the time it takes to search for information. This also helps eliminate redundancy of effort where multiple employees are attempting to perform the same task, not realizing whose job it really is because they have never been trained otherwise. The time and money it takes to correct mistakes decreases greatly when employees do the task right the first time.

4.) Companies that put a priority on employee development make median revenue of $169,100 per employee; the median revenue per employee is $82,800 at companies that don't value training. According to HR Magazine, companies that invest $1,500 on training per employee can see an average of 24 per cent more profit than companies who invest less. Additionally, a study of 2,500 businesses done by ATD, found that companies that offer thorough training have more than twice the amount of income per employee over firms that offered less training. They also create a six per cent higher return for shareholders when training per employee is increased by $680.

5.) Effective training needs to be tailored to employee and business needs and be an ongoing venture. Skills need to be regularly updated to keep your workforce ready and able to support your company. Your Human Resources Department should make it a priority to integrate processes to encourage and promote employee education and skill development while also keeping the amount of time spent away from work to a minimum. This is where eLearning courses come to the rescue. A single eight-hour training course can be condensed into a three-hour eLearning course that students can access on their own time and terms. eLearning courses offer a great chance for retention because students can go back and look at sections they didn't understand, and the information is broken down into more manageable bites.

Before forgoing training always consider how much more expensive it is not to train. Consider productivity loss, the cost of employee turnover, and lost customers due to mistakes made by improperly trained employees. Your employees' training and happiness is just as much an asset as the workers themselves.

Excerpts from The True Cost of Not Providing Employee Training *by Shift.*

Dates to Remember

Aug. 16 to 18: 2019 Summer Family Fun Board Meeting, Digby Pines Hotel, Digby, N.S.

Sept. 12: 2019 Annual Golf Tournament, Royal Oaks Golf and Country Club, Moncton, N.B.

Feb. 20 to 23, 2020: 2020 ConAtlantic, Delta Hotel and Convention Centre, Charlottetown, P.E.I.

Using infrastructure to combat climate change

Blair Feltmate urges concrete associations to play an active role in promoting climate-resilient infrastructure

By Amanda Jess

The head of the Intact Centre on Climate Adaptation at the University of Waterloo believes the concrete industry should be identifying the role of concrete in creating a more climate-resilient country and presenting it to the public.

Blair Feltmate recently spoke about the risks of climate change on infrastructure in Canada at ConAtlantic, outlining what the country is facing and the next steps.

During an interview about the presentation, he says there's been a lot of discussion about concrete in terms of energy efficiency and lowering the carbon footprint associated with production.

"There hasn't been enough emphasis placed on the other side of the equation, which is adaptation and resilience associated with concrete."

— Blair Feltmate,
Intact Centre on Climate Adaptation, University of Waterloo

"There hasn't been enough emphasis placed on the other side of the equation," Feltmate says, "which is adaptation and resilience associated with concrete."

The temperature of the planet has gone up one degree Celsius over a period of 100 years due to the burning of fossil fuels, he says. That increase brings more heat, more moisture in the air, and storms of greater magnitude and intensity. This has meant more catastrophic insurance claims from events like flooding and wind, averaging about $1.8 billion a year in losses.

"Flooding is the number one cost to Canada by far, relative to the expression of climate change extreme weather events. And then number two, it's forest fires," Feltmate says.

During his presentation, he spoke about the work being done by the Intact Centre, the National Research Council of Canada, and the Standards Council of Canada. Together they are developing new codes and standards to mitigate flood risk and looking at what can be done at the level of individual houses, new residential community design, existing communities, and commercial real estate. They're also working on standards in relation to forest fire risk to communities and heat risk .

He says organizations such as the Atlantic Concrete Association should map out the risk factors associated with climate change in order to determine the role concrete can play in mitigating the effects. Concerns include flooding, permafrost loss, and shoreline erosion and should be considered in all of areas that could be impacted, such as different types of infrastructure and industry sectors. From there, he recommends coming up with a shortlist of priorities where concrete can be immediately beneficial and cost-effective.

"We do not have the luxury of time when it comes to adapting to climate change [and] extreme weather risk."

The benefits of investments in concrete-based solutions to flooding – things such as culverts, diversion channels, and holding ponds – are felt at the local level, which is typically attractive to politicians, he says. He adds the expense of mitigation structures results in cost-savings down the road when it prevents losses due to extreme weather.

He also suggests concrete associations should be working with groups who specialize in natural infrastructure, such as ponds and rivers, to make the country more flood resilient.

"Natural infrastructure won't solve all the problems. And built infrastructure won't solve all the problems. It's a combination of both," Feltmate says.

Blair Feltmate, head of the Intact Centre on Climate Adaptation at the University of Waterloo (left), was a keynote speaker at ConAtlantic 2019. Jamie Reid, past president of the ACA, joined Feltmate after his presentation.

Two down, one to go

Concrete construction at Muskrat Falls and Grand Falls complete, while White Rose enters intensive phase

By Andy Walker

Three major, concrete-intensive projects in Newfoundland Labrador are either wrapping up or moving into their most intensive phases.

The rehabilitation of the main dam in Grand Falls for Newfoundland and Labrador Hydro included the stabilization of the existing concrete gravity dam, installation of new pedestrian and vehicle bridges, installation of a new inflatable dam, installation of a new control building and all related technical and electrical work, installation of a cofferdam, and construction of a new 250m long concrete spillway. The project is now mostly complete and commissioned by the Newfoundland and Labrador Hydro.

For the West White Rose Project (WWRP), the work includes the development of a concrete gravity structure (CGS), built by the SNC-Lavalin- Dragados-Pennecon General Partnership (SDP), and an integrated topsides facility. Clients involved in the project include Husky Energy, Suncor Energy Inc. (Suncor) and Nalcor Energy Oil and Gas Inc. (Nalcor).

The partnership is constructing the CGS in the Argentia Graving Dock, located on the Argentia Peninsula approximately 130 km from St. John's. The CGS, with an overall height of 145m and base diameter of 122m, will require 76,000m3 of concrete in its construction and will take place in a purpose-built dry dock.

The CGS will weigh 210,000 tonnes. Once completed and installed in the White Rose field, the CGS will support a topside module to enable drilling and oil extraction 350 km away from the coast of Newfoundland in the Atlantic Ocean. Last September, the West White Rose Project in Argentia reached an important milestone with the completion of the base slab.

The White Rose field and satellite extensions are located in the Jeanne d'Arc Basin, 350km east of Newfoundland and Labrador in approximately 120m of water.

Work is nearing completion on the North and South Dams at Muskrat Falls. Nalcor Energy is the client, and the contract is a joint project between Pennecon and Barnard Construction, a Montana-based company that specializes in dams, tunnels, and oil and gas projects.

The Barnard Pennecon Limited Partnership (BPLP) contract on the Muskrat Falls Project consists primarily of the construction of the South Dam and North Dam. The South Dam is a 20m high, 243m long embankment structure, and the North Dam is a 39m high, 450m long roller compacted concrete (RCC) dam.

The South Dam was completed in October 2017, and in February 2019 the construction of the North Dam was completed. For the North Dam, a total of 243,000m3 of concrete was placed. BPLP is currently in the process of completing all remaining activities under the contract.

This remote and challenging project also includes the construction and removal of a 115m single-span temporary access bridge, quarry development, aggregate production, concrete production, extensive dewatering, establishment and decommissioning of sedimentation ponds, construction of permanent site access roads, installation of geotechnical instrumentation, and site restoration.

Both the North and South Dams at Muskrat Falls are now complete.

The West White Rose Project recently reached an important milestone with the completion of the base slab of the gravity-based structure.

Rehabilitation of the main dam at Grand Falls for Newfoundland and Labrador Hydro is complete.

New building code on its way

Climate change the focus of new code development, concrete mix research

By Andy Walker

When the new building code officially comes on stream in 2025, the emphasis will be on creating structures designed to better withstand the impact of climate change.

"It's something we as an industry take very seriously," says Andrew Smith of the Atlantic office of the Canada Masonry Design Centre.

While Smith stresses his job is primarily to explain the technical aspects of the current regulations, he says the industry is doing a great deal of research on adapting to climate change and industry representatives are working with government to make sure they have input into the new code.

A report released earlier this year by Environment and Climate Change Canada indicates this country is warming up approximately twice as fast as the global average. The country's annual average temperature over land has warmed by a best estimate of 1.7°C since 1948, with northern Canada experiencing a temperate increase of 2.3 degrees.

Headlines proclaiming record flooding, wildfires, and storms are now commonplace. New specifications for concrete mixes for paving are being researched and tested. Smith says, "This is very much a work in progress and to a certain extent it always will be… the building code is always changing to reflect new realities and conditions."

However, he says no topic has ever generated the amount of research within the industry that has occurred in trying to deal with climate change.

"There are so many aspects to it… whether it's being carbon neutral, being more energy efficient, or thermal efficiency, there is a lot of work being done, but we don't really have anything we are ready to share at this point."

Smith says everybody within the industry is aware of the need to adapt their practices to allow for climate change and the industry will continue to have a place at the table going forward as the new codes are implemented.

The decision by the National Research Council to update the building codes to deal with climate change comes from a recommendation from then Auditor General Michael Ferguson in 2016. The Canadian Commission on Building and Fire Codes, which is an independent committee of volunteers established by the National Research Council of Canada, is responsible for developing and updating the National Model Codes.

Searching for proper comparisons

Study shows gaps in method for calculating emissions in building materials

By Andy Walker

A study commissioned by the Cement Association of Canada shows serious gaps in the current method of calculating greenhouse gas emissions from building materials.

According to the research by the International Institute for Sustainable Development, failure to account for all carbon emissions may be undercutting climate change efforts. The study gives a thumbs up to using life cycle assessment (LCA) as the method of measuring carbon emissions, but warns "more data, transparency, and robust LCA standards are needed, especially with respect to accounting for biogenic carbon from wood products."

The researchers worked with an advisory group composed of university-affiliated academics, notable environmental organizations, and architects/designers from the green building community.

In the case of wood, the study notes LCAs don't include the emissions from what is known as "biogenic carbon," which results from cutting down the wood. Biogenic carbon emissions result from the disturbances to living organic matter such as carbon losses from soil disturbance, from the conversion of old-growth primary forest to less productive secondary forest, as well as losses from imperfect post-harvest reforestation efforts.

"Collectively, these emissions can represent up to 72 per cent of a wood product's total life cycle emissions, challenging the prevailing assumption that wood construction materials are lower carbon than other construction materials, such as concrete and steel," the study says.

The association commissioned and funded the study in the aftermath of a lobby effort by the wood industry for mid-rise and tall wood construction across North America. The study says, "LCAs can be an effective tool for reducing carbon emissions. But without proper care, they can produce results that are misleading or wrong, potentially leading to more GHG emissions, rather than less."

"Existing built environment LCAs produce widely variable results for similar projects for two main reasons: first, there remain important gaps in the data available; second, assumptions and uncertainties that may have significant impact on LCA results are typically not disclosed," the research study says. "This can lead to flawed conclusions, misdirected efforts, and suboptimal GHG outcomes for Canadians."

As well, the researchers warn LCAs tend to discount regional variability in different building materials when it comes to greenhouse gases. The study notes there are differences when it comes to extraction of raw materials, the carbon emission intensity of the production phase, and the disposal conditions at the end-of-life stage. While the production factors can vary significantly from site to site and region to region, most assessments use national or global data.

"Life cycle assessments must look at the whole picture, supported by robust standards and data," the study recommends. "More data, transparency, and robust carbon accounting standards are needed, especially with respect to biogenic carbon from wood products."

The study calls on the federal government to invest in up-to-date regionalized, national life-cycle inventories, "including a fulsome carbon accounting in LCAs for all building materials, with LCAs for wood products needing to consider regional biogenic carbon impacts against net carbon emissions. Energy efficiency, long service life, and material efficiency should be the priorities for decarbonizing the built environment."

The study says embodied greenhouse gas emissions are important, but argues "improvements in energy efficiency and developing new low- or net-zero-energy buildings still offer the highest potential for decarbonizing the built environment."

It urges policymakers to focus on promoting building durability, resiliency, and energy efficiency improvements. To address embodied GHG emissions in buildings, it suggests policy makers and building professionals should prioritize material efficiency and accelerating the adoption of emerging low carbon material production technologies.

Over the next several months, the Concrete Association of Canada plans to meet with federal and provincial government officials across the country, architects, think tanks, and environmental-based non-government organizations to make them aware of the study.

Testing out new connections

Pam Woodman (right), executive director of the Atlantic Concrete Association, recently dropped in to check out the research Dalhousie's concrete lab is currently undertaking in pursuit of improved concrete construction. The ACA is trying to foster closer ties between the industry and educational institutions.

Hydration stabilizers

The scalpels of set control

David Kline, GCP Applied Technologies

Hydration stabilizers are advanced set retarders. While conventional set retarders enjoy widespread use to slow concrete set times, on many projects additional set control is needed.

Hydration stabilizers are formulated to provide this extended control, ranging from a few hours of delayed set for long haul or delayed placement situations, to over 30 hours for large continuous pour projects.

With hydration stabilizers, the window of plasticity can be extended in a predictable manner to bring new flexibility and opportunity to a variety of projects. These products typically also meet ASTM C494 Type B and D.

Typical uses include:

- Long hauls to remote sites;
- Extended truck discharge times;
- Controlling temperature increase;
- Predictable extended set for continuous placement on mass concrete and tremie projects; and
- Improved strength and concrete quality.

Compatibility with other admixtures, batch sequencing

Hydration stabilizers stabilize the hydration process of Portland cement, preventing it from reaching initial set. This stabilization isn't permanent and is controlled by dosage rate.

These products are compatible with most admixtures and generally added to the concrete mix near the end of the batch sequence for optimum performance. Different sequencing may be used if local testing shows better performance.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to ensure compatibility, and to optimize dosage rates, addition times in the batch sequencing, and concrete performance. Please consult your admixture representative for guidance.

Hydration stabilizer (scalpel) verses traditional set retarder (axe)

The scalpel provides predictable set times with linear dosages allowing precise control over mix set times. The axe for short retardation times is somewhat predictable, but with no linearity at high dosages can cause exponential results. A hydration stabilizer could be one of the most valuable tools in a producer's inventory.