Innovative 3D Road Milling Technology Makes its Debut in the Town of Parry Sound as a Municipal Pilot Site of a European Solution for Efficient, Cost-Saving, and Sustainable Road Resurfacing

Innovative technology for municipal infrastructure repairs, which saves money and the environment, was showcased earlier in September in the Town of Parry Sound. The municipality has chosen a progressive 3D road milling technology for which it teamed up with Control System CA. A Scandinavian-Canadian company with technology known as Exact Street from the Czech Republic, Control System is renowned for its next generation of road rehabilitation technology. Its impact is increasingly visible across Ontario communities, and this most recent application shows the potential for further applications.

Striving for effective and sustainable road maintenance with ground-breaking technology

The Town of Parry Sound has decided to use 3D milling technology to address the degradation of its road systems while also promoting its climate strategy and future infrastructure resilience. On September 12, 2022, the 3D road milling project was presented at an official event before the beginning of milling operations, with an attendance of about 40 provincial and international officials, industry stakeholders, and experts.

Mike Kearns, Director of Public Works for the Town of Parry Sound, explained that fixing rutting and ensuring sufficient drainage, along with reducing CO2 emissions by minimizing the amount of material milled, is one of the main reasons the Town of Parry Sound is investing in technological solutions to traditional problems. Rutting is a structural deformity in the road caused by seasonal changes and load pressure from vehicles. If left unchecked, rutting can render the road dangerous or unusable for vehicles. The technology of 3D milling was therefore selected to address these deformities effectively and increase the road's longevity and smoothness. Rotomill and Control System CA further commented on the technology, explaining its benefits and practical aspects. Kenneth Shannon from the Ontario Ministry of Transportation added, "Automated Machine Guidance (AMG) has allowed a higher degree of precision than what was previously specified in contract provisions." Therefore, the province had to adapt relevant regulations; specifically NSSP (Non-Standard Special Provisions) was amended to include Ontario Provincial Standards Specifications OPSS 510 on Contractor Partial Depth Asphalt Removal Design and Automatic Machine Guidance.

The complete recording of the event is available here.

Beyond the practical infrastructure aspects, it is especially noteworthy that the Town of Parry Sound simultaneously uses the technology to support its climate goals. Benjamin John from the Georgian Bay Biosphere explained that in July of 2019, Town Council joined the Federation of Canadian Municipalities and ICLEI - Partners for Climate Protection Program. This program commits the Town to reduce GHGs to 30% of 2005 levels by 2030. To achieve these goals, the Town has endeavoured to seek out and utilize new technologies and processes in maintaining and constructing municipal infrastructure. For example, the Exact Street process, which uses accurate 3D data to repair road surfaces, allows the town to more effectively achieve these targets while producing a superior result versus traditional rehabilitation projects.

Control System CA offers a complex solution with a Central European background

Interestingly, research and development for Exact Team's 3D milling solutions were executed in the Czech Republic before being introduced to Canadian roads in collaboration with the Czech Technical University in Prague. Control System CA's previous major projects in Ontario include Hwy 10 in Orangeville, Hwy 89, Hwy 17 South Bay pass of Sudbury, Hwy 17 East from Sudbury, Hwy 11/17 in North Bay among others. With nearly 200 km of milling runs that have been milled on Ontario highways during these projects, rather than having to arduously and expensively address these issues during the milling process, in contrast the technology demonstrates its ability to accurately identify any issues early on and design the optimal repair procedure.

The technology uses commercially available field data collection processes and proprietary software of Control System to develop a 3-dimensional milling model for asphalt pavements with millimeter accuracy. This optimization ensures only necessary asphalt is removed, reducing construction time and surplus materials.

The average cost of this technology is approximately 3% of the total project cost, which is recouped in turn through trucking savings and optimization of the milling operation. Much more significant but harder to quantify savings are on the life cycle cost of the road and the CO2 reduction, which arises both directly during the repair by reducing e.g. trucking but especially in the long run by driving more economically on even roads.

With Control System's technology, the following efficiencies were observed;

1. Prolonging the longevity and smoothness of the road, which is unattainable by traditional milling methods, improves driving comfort and safety.
2. A reduction in milled material being taken from the surface reduces the environmental impact of infrastructure rehabilitation. The amount of milled material saved is confidential but reduces the amount of milled material being taken off by 10's of percentages; in past projects, milled material was conserved by up to 30%.
3. The speed of the milling process was increased by 25%, preventing road rehabilitation's impact on traffic and citizens.

The material savings of Exact Street milling versus standard constant-depth milling were designed to be approximately 20% for Bowes St. and 25% for Joseph St. & Church St. Higher savings could only be achieved at the cost of repairing Curbs & Gutters, whose curvature significantly limited the possibilities of optimizing smoothness, water drainage and material savings. The final milling strategy was chosen from 4 different alternatives based on several meetings and detailed analysis. The possibility of designing different repair variants and selecting the most suitable one taking into account the different evaluation criteria and considering the opinions of multiple experts is one of the main advantages of Exact Street technology.

It is also relevant to mention that 3D data can be used for many other purposes, not only for road repair. For example, to check whether the surrounding vegetation does not encroach on traffic profiles, to propose bridge repairs, to check the stability of rock walls in the vicinity of roads, etc. The measured data can thus find many other uses and thereby fundamentally reduce its relative price once economies of scale are achieved.

Leading by example in municipal sustainability efforts

The Town of Parry Sound demonstrated that 3D milling technology has the potential to help other municipalities in Ontario and across Canada achieve sustainable results in line with climate goals. Exact Street considerably reduces the energy in milling with less asphalt milled and transported, therefore securing a significant reduction of GHGs produced. Using a European-based technology, the town also reminds us that the fight against climate change is a global effort especially bringing close EU and Canada, with sustainable development even being part of the trade agreement CETA. While over a thousand cities signed up for the United Nations' Race to Zero global campaign, road infrastructure can be underestimated in reaching those targets.

The Czech Republic, an EU member and home of Exact Street R&D, is already underlining the importance of sustainability in road infrastructure. The City of Prague, to keep with the COP 26 commitments, has developed its climate plan, including sustainable buildings, renewable energy, recycling, and road adaptation measures, together with upgraded asphalt and concrete, to reduce carbon emissions by 45% before 2030. Also, this supports the Town of Parry Sound's recent experience that 3D milling technology can be a unique and innovative answer to sustainable cities everywhere while saving municipalities the costs from imperfect and ineffective road repairs of the past.

Consulate General of the Czech Republic in Toronto, Town of Parry Sound, Control System Canada, September 2022

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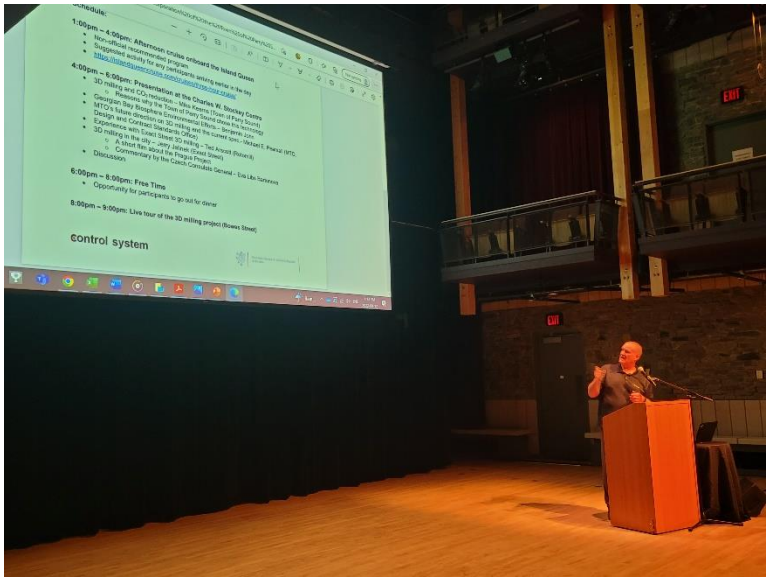
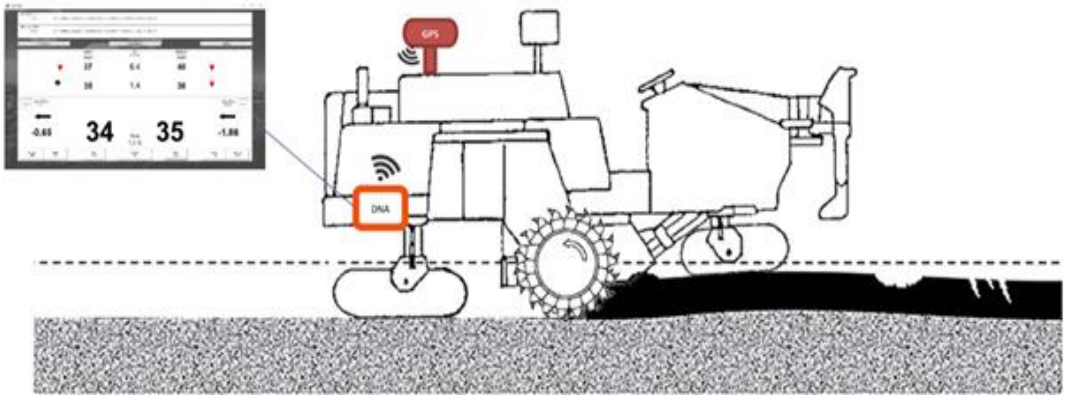
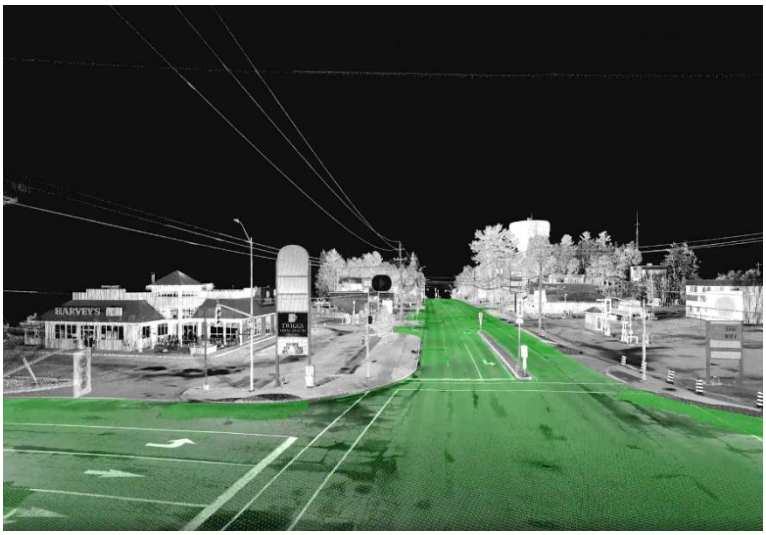
Photos from the launch of the project, September 12, 2022; and illustration photos

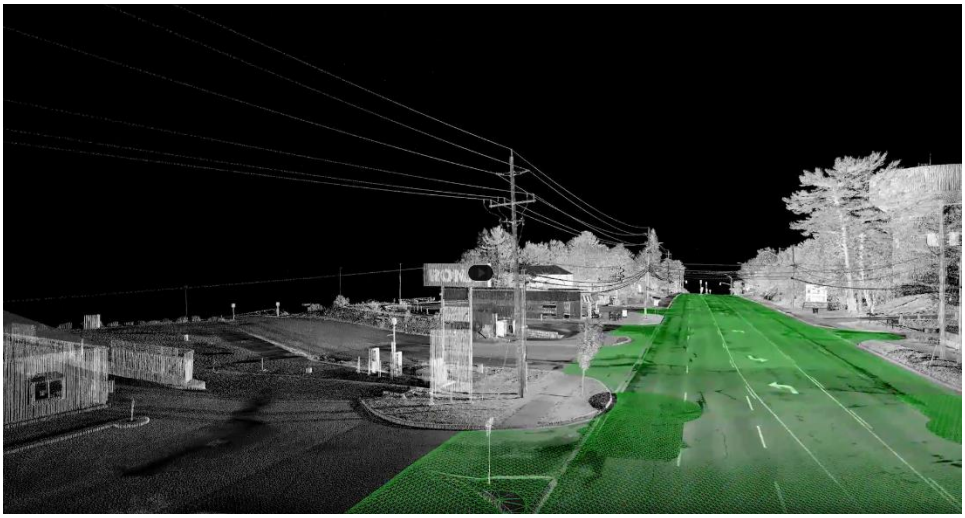




Technical documentation from Control System CA

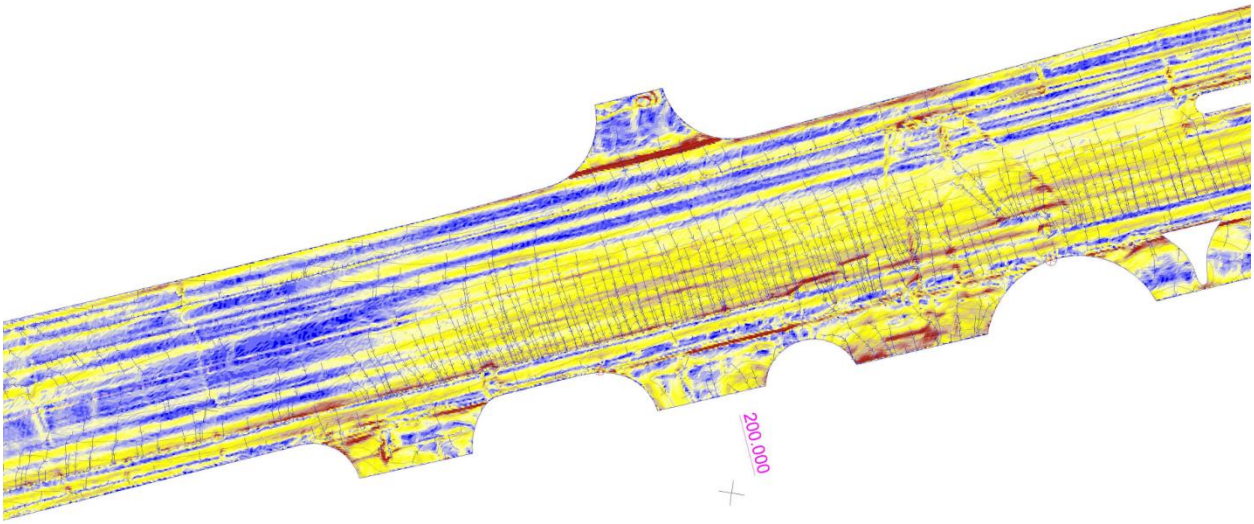
The visualizations of the measured data for Bowes Street in Parry Sound can be accessed here:
https://cloud.teamexact.cz/s/oTbd5FmWagRo6qk





Furthermore you can compare:

- how the water drainage looks like before the repairs - (water does not flow out, it stays in the ruts)



Control System CA

ParrySound Road surface reconstruction
Bowes St.

digital terrain model, measurement 210924

		Date: 24. 9. 2021
conturelines: 0.04m		Scale: 1:600
coord. system:	NAD83 UTM17N, CSRS v9 CGVD2013	Bowes_surface210924

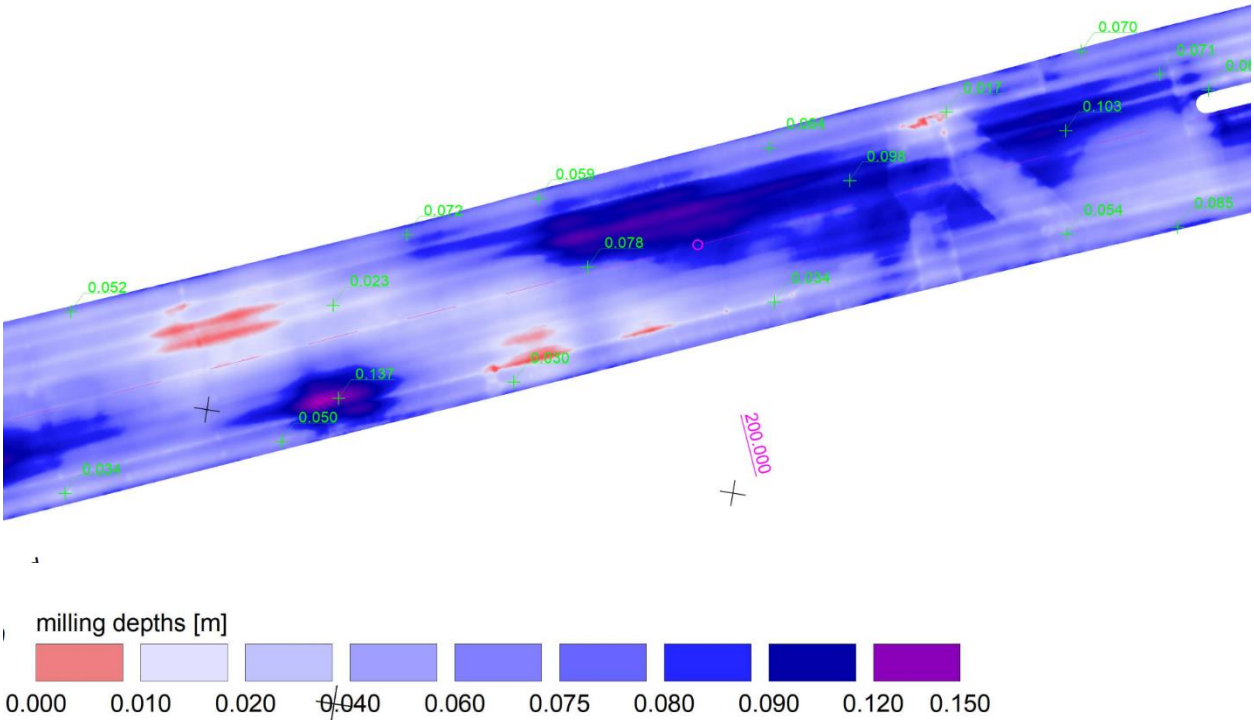
surface drainage, state before reconstruction

storm drain
water flow

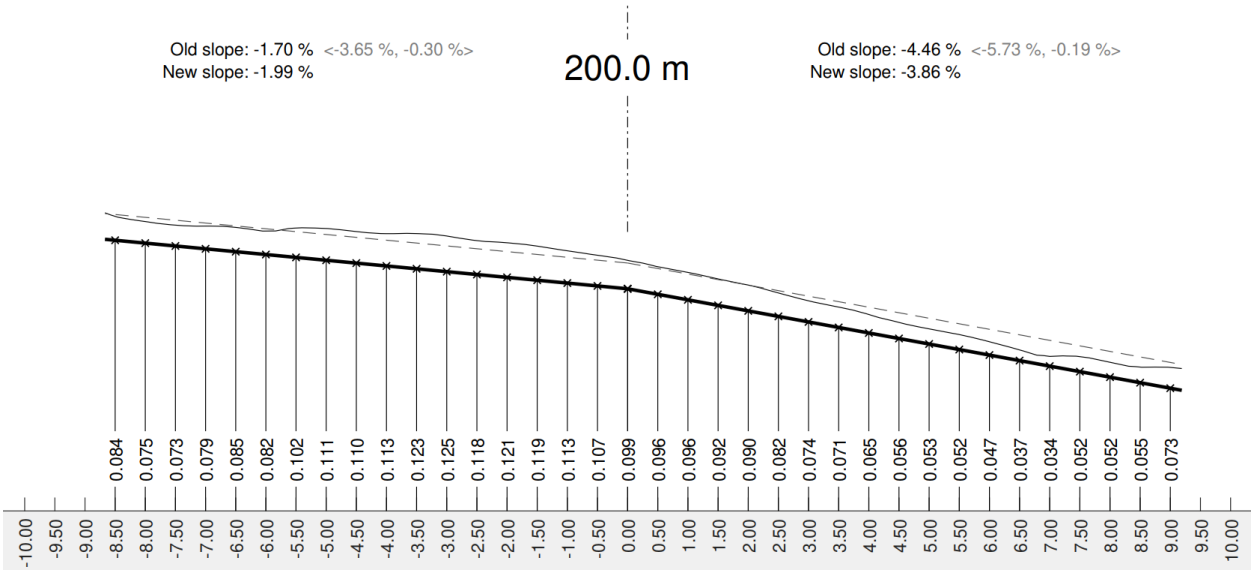
surface slope [deg]

0.00 0.35 0.70 2.00 3.00 4.00 5.00

- what milling depths were designed for the repair - (0mm -137mm),



- what the cross section looks like at this location (STA 200)



- design water drainage after milling & paving