Project Name:	10-18: Develop a light self-compacting mortar for mobile concrete mixer	**Start Date:**	2020-03-01
Project Number:	2011	**Completion Date:**	2020-12-31

Project Details:

Scientific or Technological Objectives:

[213] This project is an attempt by BMQ to develop a light self-compacting mortar for mobile concrete mixers. This product was already existing for conventional concrete mixers. However, given the greater flexibility of the mobile concrete mixer, a BMQ client requested that the company develop such a product for mobile concrete mixer. BMQ therefore had to develop a mortar that could be poured between existing storm sewer pipes and new pipes, without deforming them.

[214] Mortar differs from concrete in that it does not contain stones. The term "self-compacting" implies great fluidity - that is, the ability to spread by the sole effect of gravity - while the term "light" means low density, i.e. a high air content in The mixture. The air content sought for the mixture in the context of this project was 20%, but it was also necessary that the resistance of the mortar to compression be at least 20 megapascals.

Field of Science/Technology:

Civil Engineering (2.01.01)

Project Details:

Intended Results: Develop new processes
Work locations: Research Facility
Key Employees:
Evidence types:

Scientific or Technological Advancement:

Uncertainty #1: Technological uncertainty

[220] In the event that the activities carried out by BMQ in the context of this project are qualified as SR&ED activities, the parties' disagreement would only remain with regard to the salaries for which the deduction is claimed by BMQ, which total 1,710 $ and relate essentially to the 34 hours devoted to bibliographic research to find foaming products and equipment as well as to certain discussions between Mr. Bertrand and Mr. Dubé for the development of mixtures, which took place between November 7 and 20 November 2009. The Respondent agrees that amounts totaling $ 2,202 for salaries, $ 427 for materials and $ 360 for costs of subcontractors would be deductible expenses under section 37 and eligible for the calculation of the ITC.

7.2 The parties' submissions
[221] According to the appellant, the existing products and equipment were not designed for the mobile concrete mixer. The uncertainty consisted in the absence of existing data on the ability of the mobile concrete mixer to produce the mortar in question and in the absence of foaming equipment that would be suitable for the mobile concrete mixer. The work enabled BMQ to acquire new knowledge on the limits regarding the capacity of foaming additives and a mobile concrete mixer to produce mixtures with high air content. The project also made it possible to determine that the source of these limits was the mixing process of the mobile concrete mixer. These activities therefore constitute SR&ED activities since they can be qualified as experimental development work undertaken in the interest of technological progress.

[222] According to the respondent, the activities carried out by BMQ cannot be qualified as SR&ED since the whole does not seem complicated. In fact, in less than three weeks, the equipment was designed and the mixture was produced. According to Mr. Durban, BMQ has not deviated from standard methods by using a foaming adjuvant and an air entraining adjuvant whose characteristics precisely consist in generating air in a mixture. Adding air with this equipment designed to add air also had a predictable result, which was to increase the air content.

THE JUDGE RULED
[224] The evidence showed, on a balance of probabilities, that technological uncertainty was present in the case of this project. BMQ was unable to predict whether the generally available experience or knowledge or current practices would meet the criteria required by its client. The objectives set by the client were achievable by using a conventional concrete mixer, but it was impossible for BMQ to predict whether they would be achieved by means of the mobile concrete mixer. Uncertainty existed with respect to the manufacture of a very light mortar product with 20% air that can be installed in storm sewer lines without distorting the old lines. The evidence showed that no data existed regarding the ability of the mobile concrete mixer to produce such mortar.

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Technology or Knowledge Base Level:

Activity #1-1: Activity 1 (Fiscal Year 2020)

Methods of experimentation:

[216] BMQ tested several mixtures by trying to successively modify the adjuvants (air entrainer and foaming agent existing on the market) and the cement content of a standard mortar mixture. Air content, temperature, spreading and compressive strength tests were performed on the mixtures as part of this project. Test results demonstrated an air content ranging from 12% to 15%; these results were therefore below the criteria required by the client.

[217] Faced with these unsuccessful tests, BMQ employees worked on the design of equipment to further foam the mixture by injecting compressed air. They were inspired by equipment designed for conventional concrete mixers but which could not be installed on a mobile concrete mixer. BMQ has repeated the tests, but without more success.

Results:

[218] The project was unsuccessful since BMQ failed to obtain an air content of 20% for the mixture. In fact, despite the adjustments to the mixture and the use of the equipment designed by the two BMQ employees, it was not possible to increase the air content of the mixture.

[219] To date, the product that BMQ has attempted to design still does not exist. This project has not been resumed since that time.

Conclusion:

THE JUDGE CONCLUDED

[225] BMQ also sought technological progress, although it was unable to meet the criteria required by its client. Indeed, progress would have consisted in the incorporation in a mixture of mortar produced by means of a mobile concrete mixer of a characteristic, that is the air content of 20%, difficult, if not impossible, until then, to reach in current practice. The fact that this project did not provide the desired product does not exclude the activities from the definition of SR&ED activities. As indicated by Mr. Dubé, BMQ has acquired certain knowledge regarding the limit of the mixing energy of the mobile concrete mixer and the effects of the limited mixing time of the latter on concrete / mortar mixtures.

[226] According to the respondent, given that BMQ employees took only a few hours to adapt equipment designed for conventional concrete mixers to the mobile concrete mixer, this could not be so complicated, and that this indicates that the activities cannot be qualified. SR&ED activities. I do not see how the criterion of difficulty or ease in doing something can be relevant for the purposes of qualifying an SR&ED activity. The evidence showed that the two BMQ employees designed equipment for the mobile concrete mixer based on equipment designed for conventional concrete mixers. These employees could not adapt the equipment designed for the conventional concrete mixer directly to the mobile concrete mixer; thus, I conclude that these activities are not part of current practice.

[227] The evidence also showed that Mr. Dubé systematically studied the problem raised by the low percentage of air in the mixtures tested and did some experimentation to determine the causes of these results. Tests have been performed by an independent laboratory. The assumption was made that the addition of a foaming aid and an air entraining aid and the injection of air would increase the air content of the mortar mixture. I consider that the scientific method was followed by BMQ. Although there was no detailed contemporary account of the tests, the documentation produced at the hearing and the testimonial evidence, particularly the testimony of Mr. Dubé, made it possible to detail the activities undertaken within the framework of this project .

[228] For these reasons, the activities carried out by BMQ in the context of this project constitute SR&ED activities.

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