Project Name:	Daves Diesel - injector process LOSS	**Start Date:**	2023-05-31
Project Number:	2305	**Completion Date:**	0001-01-01

Project Details:

Scientific or Technological Objectives:

Field of Science/Technology:

Mechanical engineering (2.03.01)

Project Details:

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

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Project Name:	Daves Diesel - injector design LOSS	**Start Date:**	2023-05-04
Project Number:	2305	**Completion Date:**	2023-10-31

Project Details:

Scientific or Technological Objectives:

Measurement	Current Performance	Objective	Has results?
remanufacture injectors (number)	0	3	No

This project description is based on the Tax Court of Canada judgment of Dave's Diesel Inc. v. The Queen Date 2022-06-10 Neutral citation 2022 TCC 62 File number 2018-1618(IT)G

The Nature of the Project
[6] The Appellant called Mr. Rushi Dave as its only witness. Mr. Dave was General Manager of the Appellant in 2013 and 2014. He was one of four individuals who worked on the project.

[7] Mr. Dave did not study mechanical engineering and has no degree, certificate or designation in the field. However, he did study business and marketing and worked for a large advertising, marketing, and public relations firm before joining the Appellant 15 years ago.

[8] Mr. Dave's father established the Appellant's business in Brampton, Ontario a decade before starting the project. Although Mr. Dave described the Appellant as a fuel injection shop for the diesel engine industry, it was not a mechanic shop as no mechanics worked there.

[9] Before starting the project, the Appellant remanufactured components of used mechanical fuel injection systems for dealers under warranty programs offered by the manufacturers of the injectors. The Appellant went about remanufacturing components of used mechanical fuel injectors in the following way:

The process was to receive the component from an engine shop, like the dealership, then we would disassemble it, do an assessment of its failures, and then reassemble it with brand new components, and put it on a test stand to recalibrate [it] to [the] provided manufacturer specifications. [3]

[10] By 2007 or 2008, electronic fuel injection systems began to replace mechanical fuel injection systems in diesel engines. The Appellant found itself in difficulty as manufacturers would no longer pay the Appellant to remanufacture components of their used fuel injection systems. Presumably, they wanted their customers to purchase new units as replacements. In any event, the Appellant needed a new source of income.

[11] The Appellant, therefore, set out to find a way to remanufacture injectors on its own. Those injectors were found in diesel-powered trucks, generators, marine equipment, and construction and farm equipment. The Appellant studied three types of injectors as part of the project:

(a) Delphi 4 Pin (an electronic fuel injector used in certain Volvo diesel engines);

(b) C7 (an electronic fuel injector used in certain Caterpillar diesel engines); and

(c) ISX (a mechanical fuel injector used in certain Cummins diesel engines).

Field of Science/Technology:

Mechanical engineering (2.03.01)

Project Details:

Intended Results:	Develop new processes
Work locations:	Commercial Facility
Key Employees:	
Evidence types:	Records of resources allocated to the project, time sheets; Samples, prototypes, scrap or other artefacts; Photographs and videos; Design of experiments; Records of trial runs

Scientific or Technological Advancement:

Uncertainty #1: Technological uncertainty

[26] The Appellant says that the relevant “technological uncertainty” was whether it could successfully develop a process to remanufacture the three different types of injectors. [11]

The most significant underlying key variables are:

shim thickness (unresolved), spring pressure (unresolved)

Technology or Knowledge Base Level:

Activity #1-1: Activity 1 (Fiscal Year 2023)

Methods of experimentation:

Method	**Experimentation Performed**
Trials:	22 runs / samples
Physical prototypes:	3 samples

21] Most of the diary entries are rather concise. The following are some of the more descriptive ones (square brackets indicate the type of injector tested):

January 4, 2013

Broke [Delphi 4 Pin] injector trying to understand how it comes apart.

January 23, 2013

Purchased and tested 12 [C7] cores and found all to be operating differently and having leaks from different sections of injector.

February 25, 2013

Received prototype [C7 adapter] from machine shop and installed. The thinner O ring would not stand up to the pressure and kept breaking.

March 6, 2013

Continued [ISX] trials and documenting results. Not ideal and still not operating as expected. No atomization.

March 15, 2013

Used a thin steel punch and applied pressure from the top of the [Delphi 4 Pin] injector and popped out the terminal insulating sleeve and seal.

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September 12, 2013

Run [Delphi 4 Pin] trials with different shim thicknesses.

September 25, 2013

Spring pressure trials [Delphi 4 Pin].

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[22] The Appellant also produced a partial record of a single test performed on a C7 injector in 2013 (Exhibit A-2 reproduced at Appendix “A”) and a partial record of a single test performed on the same type of injector in 2014 (Exhibit A 1 reproduced at Appendix “B”).

[23] As Mr. Dave presented his oral evidence, he showed the Court a series of colour photographs illustrating the machines and tools used in the project.

Was a detailed record of the hypotheses, tests, and results kept as the work progressed?
[43] The Appellant has not satisfied its onus to demonstrate that it recorded, in respect of any particular test performed in 2013 and 2014:

(a) the formulation of a hypothesis;

(b) the testing of that hypothesis; and

(c) the modification of that hypothesis in light of the results of the test.

[44] Take the shim thickness test of September 12, 2013 or the spring pressure test of September 25, 2013 as examples.

What shim thicknesses were tested? What were the results of each test? Which shim thicknesses passed the test?

What was the standard selected for passing the test?

For the spring pressure test, what pressures were applied and for how long? What were the results of each test at each pressure and for each duration? At what pressure, and at what point, did each spring fail?

There is no record of the answers to these questions.

Results:

1. Was there a technological risk or uncertainty that could not be removed by routine engineering or standard procedures? The phrase “routine engineering” describes techniques, procedures and data that are generally accessible to competent professionals in the field.

[27] The fact that a small group of non-engineers and non-mechanics, including two unskilled labourers, did not know whether they could remanufacture three types of used fuel injectors tells us nothing about whether it was “technologically uncertain” that those fuel used injectors could have been remanufactured by a competent professional in the field.

[36] An example will illustrate the point. Here is the diary entry for February 25, 2013:

February 25, 2013

Received prototype [C7 adapter] from machine shop and installed. The thinner O ring would not stand up to the pressure and kept breaking.

[37] The hypothesis to be tested might have been: “An O-ring 5 mm. thick should withstand pressure of 50 lb/ft. as effectively as an O-ring 7.5 mm. thick”. That hypothesis would have been the subject of the test. The results of the test would have been recorded and analyzed and modifications made to the hypothesis in light of the test results.

[38] As Justice Sommerfeldt has noted, a hypothesis is “a statement to be tested by an experiment or a trial.” [16]

[39] In respect of any particular test performed in 2013 or 2014, the Appellant has failed to show:

(a) the formulation of a hypothesis (e.g., in respect of the O-ring on February 25, 2013, or the shim thickness on September 12, 2013, or the spring pressure on September 25, 2013, etc.);

(b) the testing of that hypothesis; and

(c) the modification of the hypothesis in light of the results of that test.

Conclusion:

[29] The onus was on the Appellant to demonstrate that it was “technologically uncertain” that the used fuel injectors could have been remanufactured by a competent professional in the field – a mechanical engineer, for example. [13]

[30] But even if I had found the requisite “technological uncertainty”, I would still have no basis on which to decide whether

the steps taken by the Appellant were anything other than “routine engineering” for a competent professional in the field.

There was no evidence that taking a fuel injector apart without breaking it was anything other than “routine engineering” for such a professional. Similarly, there was no evidence that understanding how the fuel injectors worked was anything but “standard procedure” for a competent professional in the field.

Documentation:

- Offline Documents: docs