Project Name:	A&D precision - Double wheel roll grinding machine (WIN)	**Start Date:**	2006-01-31
Project Number:	1902	**Completion Date:**	2008-02-29

Project Details:

Scientific or Technological Objectives:

Measurement	Current Performance	Objective	Has results?
Cost ($)	(not set)	(not set)	No
Accuracy (thou)	(not set)	(not set)	No

This project example is based on the Tax Court of Canada case of A & D PRECISION LIMITED vs. THE QUEEN Citation: 2019TCC48

The claimed SR&ED current expenditures are for the 2006, 2007 and 2008 fiscal periods with total federal ITCs of $1,212,213 across 2 projects.

[30] All of the Project #6 work claimed by A&D for each of its 2006, 2007 and 2008 fiscal periods relates to design and ultimately abandoned development of this one machine, called a “double wheel roll grinding machine” (Exhibit R-15).

[31] The novel concept, advanced by Mr. Derbedrosian, was to have the grinding head capable of being moved to either side of the middle of the workpiece for grinding. Removing and repositioning the workpiece could take 16 to 18 hours and realignment could occur. A&D knew of no other grinding machine in the world that could do this. The machine would not grind the workpiece on opposite sides of the middle of the workpiece simultaneously. But there were covers on opposite sides of what would be the middle of the particular workpiece for the two positions the grinding wheel could be moved to.

Field of Science/Technology:

Mechanical engineering (2.03.01)

Project Details:

Intended Results:	Improve existing processes
Work locations:	Commercial Facility
Key Employees:	George Predoiu (mechanical - BASc. (1970) / PEng.), Tony Derbedrosian (Metal forming - Machinist (1974) / President)
Evidence types:	Records of resources allocated to the project, time sheets; Samples, prototypes, scrap or other artefacts; Design, system architecture and source code; Records of trial runs; Contracts

Scientific or Technological Advancement:

Uncertainty #1: Technological uncertainty

[83] A&D submits that the technical risk or uncertainty in respect of the double wheel grinding machine was whether - with this novel design of having the grinding wheel capable of being repositioned from one side of the machine to the other, rather than requiring the workpiece itself to be moved - fine grinding tolerances still could be achieved. System uncertainty is also cited.

Steps to define prior art:

[33] Before deciding that A&D would build this, Mr. Derbedrosian consulted with Toshiba in Japan about whether it could build such a machine. Toshiba ultimately responded with a $6 million quote to produce such a machine but without guarantee that it could meet the required tolerances.

THE JUDGE COMMENTED:

[84] There was no knowledge, within Canada or internationally, of any grinding machine having this fundamentally novel design feature.

[85] In considering the evidence as a whole, I Conclude that there was not reasonable expectation that routine engineering

or standard procedures would establish that such a design still could achieve required grinding tolerances, defeating risks or uncertainties pertaining to excessive vibration or “chatter”.

The most significant underlying key variables are:

method to move wheel, preventing spindle overheating, vibration control methods

Technology or Knowledge Base Level:

Benchmarking methods & sources for citings:

Benchmark Method/Source	Measurement	Explanatory notes
Internet searches	20 Articles	search performed - ideally would be detailed
Queries to experts	1 responses	Toshiba Japan quoted $6 million but would not guarantee performance

Activity #1-1: 2006 to 2008 development (Fiscal Year 2006)

Methods of experimentation:

[35] Messrs. Predoiu and Derbedrosian developed specifications for the contemplated machine, including respecting headstock, carriage, wheel head and grinding performance. Again A&D views this complete machine as an assembly of systems and subsystems. And of course to meet GE specified tolerances all systems and subsystems had to well work together (A&D’s written representations, para. 302).

[36] The machine itself was built in part from re-furbishment of an older grinding machine located in Romania. Because the grinding wheel could be repositioned at either end, the traditional set-up of a grinder - wheel at one end and a pulley at the other could not be utilized. A&D envisaged driving the wheel (which could be moved to either side of the middle) from the middle of the machine using a Siemens motor. From the middle of the machine between the two wheel locations, the motor would drive the drive shaft, and the drive shaft would drive the main spindle (A&D’s written representations, para. 303).

[37] There were some novel aspects in the preparation of this machine. To help the spindle not overheat A&D used angular contact bearings that were ceramic which does not overheat, and used Kluber grease, also because ceramic does not overheat (representations, para. 306).

[38] A&D chose to fabricate rather than cast the wheel-bed of the grinding machine. A&D fabricated rather than cast the parts because this was more economical (representations, para. 307).

[39] To help minimize vibration the z-axis carriage traveled on linear guideways like the 80 ton Matteo. This was not typical and may have been the first grinder to use linear guideways. Also the foundation of the grinding machine was stiffened, again seek to minimize vibration.

[40] Further, a steady rest was designed by Mr. Derbedrosian for the grinder, to aid in eliminating or minimizing vibration.

[41] Nevertheless, there was excessive vibration when the machine was tested. Further attempts to minimize vibration (through use of optimizing software to try to isolate the vibration source, and use of vibration measuring equipment, and referral to a vibration analysis company which provided a report) were not sufficiently successful to make the machine acceptable for use. Mr. Derbedrosian decided A&D would not continue development of this machine because of the financial costs that would continue to be incurred.

Results:

THE JUDGE COMMENTED:

[88] Again, Mr. Predoiu’s testimony satisfied me that his highly knowledgeable and experienced input in his position as chief engineer in the design and manufacture of the double wheel grinder was quite focused on reducing risks. That is, he in combination with Mr. Derbedrosian did formulate theories and or plans seeking to minimize anticipated risks pertaining to vibration.

Conclusion:

THE JUDGE RULED: ELIGIBLE

[85] In considering the evidence as a whole, I conclude that there was not reasonable expectation that routine engineering or standard procedures would establish that such a design still could achieve required grinding tolerances, defeating risks or uncertainties pertaining to excessive vibration or “chatter”.

[86] Thus I find that there was technical uncertainty associated with the development and potential implementation of this

radical design concept.

[94] .. I conclude that the work that went into design and build of the grinding machine was SR&ED qualified during each of the subject three fiscal periods.

Significant variables addressed: method to move wheel, preventing spindle overheating, vibration control methods

Documentation:

- Offline Documents: Doc