NEWS

Pioneering Ryerson Rocketry Students in Conflict With Engineering School Administration

by **Craig Bamford**

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A Ryerson Rocketry Club rocket launch at the Spaceport America Cup. Credit: Ryerson Rocketry Club.

This past school semester, Ryerson University engineering students found themselves battling school administration in an attempt to build their own rocket engine.

The students were already familiar with rocketry, having competed at the annual Spaceport America Cup in the United States against teams from around the world. Many of those teams design and build their own rocket engines. The Ryerson students were inspired and wanted to follow suit, especially since many other Canadian universities (including the neighbouring University of Toronto) have had students building rocket engines for years.

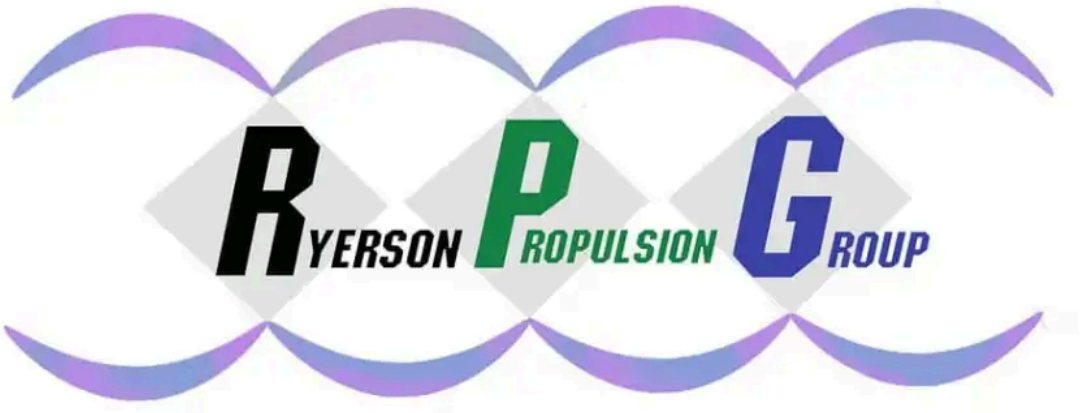
At Ryerson, though, it was new. While the university's Faculty of Engineering and Architectural Science (FEAS) still proudly advertises its own Propulsion Research Facility, the rocketry clubs at Ryerson have always used off-the-shelf rocket engines. Balin Moher and his new Ryerson Propulsion Group (RPG) wanted to change that. They created their group, and planned to temporarily split off from the existing

Ryerson Rocketry Club, design and build their own liquid nitrous oxide/liquid ethanol rocket engine, and then reintegrate themselves and their creation with the existing Rocketry Club once they were done.

What they weren't expecting — according to an interview between Moher and SpaceQ — was just how hard all that was going to be.

Ryerson propulsion group's creation and challenges

During the summer and early fall of 2018, they got to work. Moher and his group contacted potential sponsors, practiced their pitches, and worked to resolve the endless logistical and organizational details of starting up a brand new engineering-focused university student club. They pitched the organization to the Ryerson Engineering Student Society, who (according to Moher) "loved it", reached out to the FEAS, made budget requests to the University, lined up sponsors, and looked into finding members for the club and doing some direct hiring.



RPG logo. Credit: Ryerson Propulsion Group.

It all seemed to be going to plan. Students were lining up to be a part of the club: the club had “over a hundred applicants” by Moher’s reckoning. Sponsors agreed to provide materials, expertise, and a generous amount of funding—including solid financial support from aviation engine manufacturer Pratt and Whitney. The university agreed to allow them to become an official Ryerson student club, and gave them a small budget. One of the FEAS’s technical advisors was consulted and seemed seemed fully on board, too. Moher was proud to say that the man seemed “wowed” by the project.

Then, just as they were moving forward, the university pulled the carpet out from under them.

Moher already knew that there were issues. At the financing meeting, Moher recalls the administrators were “focused on their laptops, and didn’t seem to understand what we were trying to do with the money”. They had requested $40,000 in support, but only received $5,000, which (at the time) seemed to confirm Moher’s fears that the university didn’t realize that their club was going to be creating a rocket engine, and required a serious budget to do so.

“Amazing turn out tonight at our new member meeting. Over 80 engineers have now kicked off an incredible project to develop a liquid ethanol liquid nitrous oxide rocket engine”. Credit: Ryerson Propulsion Group.

A few weeks later, in October, the university seemed to finally understand the RPG’s project. They reacted dramatically, freezing the RPG’s funding and blocking access to club finances. The cheque from Pratt and Whitney sat unused, waiting to be cashed, and the club lost any ability to conduct its own procurement or basic spending. University representatives, including

the Faculty's Manager of Student Engagement and Development, indicated that they were uncomfortable with something as "dangerous" as students creating a rocket engine, and requested more information.

This was a surprise to Moher and his team — after all, students were building engines at the University of Toronto, University of Waterloo, McGill University, the University of British Columbia (UBC), and all across the United States — but they rallied, and told the university they'd have detailed information at the start of the winter semester.

The propulsion group's epic proposal

In the beginning of January, they finally finished their supporting documentation: a 130-page proposal with detailed plans, designs, and logistical support. It demonstrated how they planned to design and build the engine, develop the organization, source the materials, get their funding, and perform the testing. It had both nozzle geometry calculation equations and detailed budgeting.

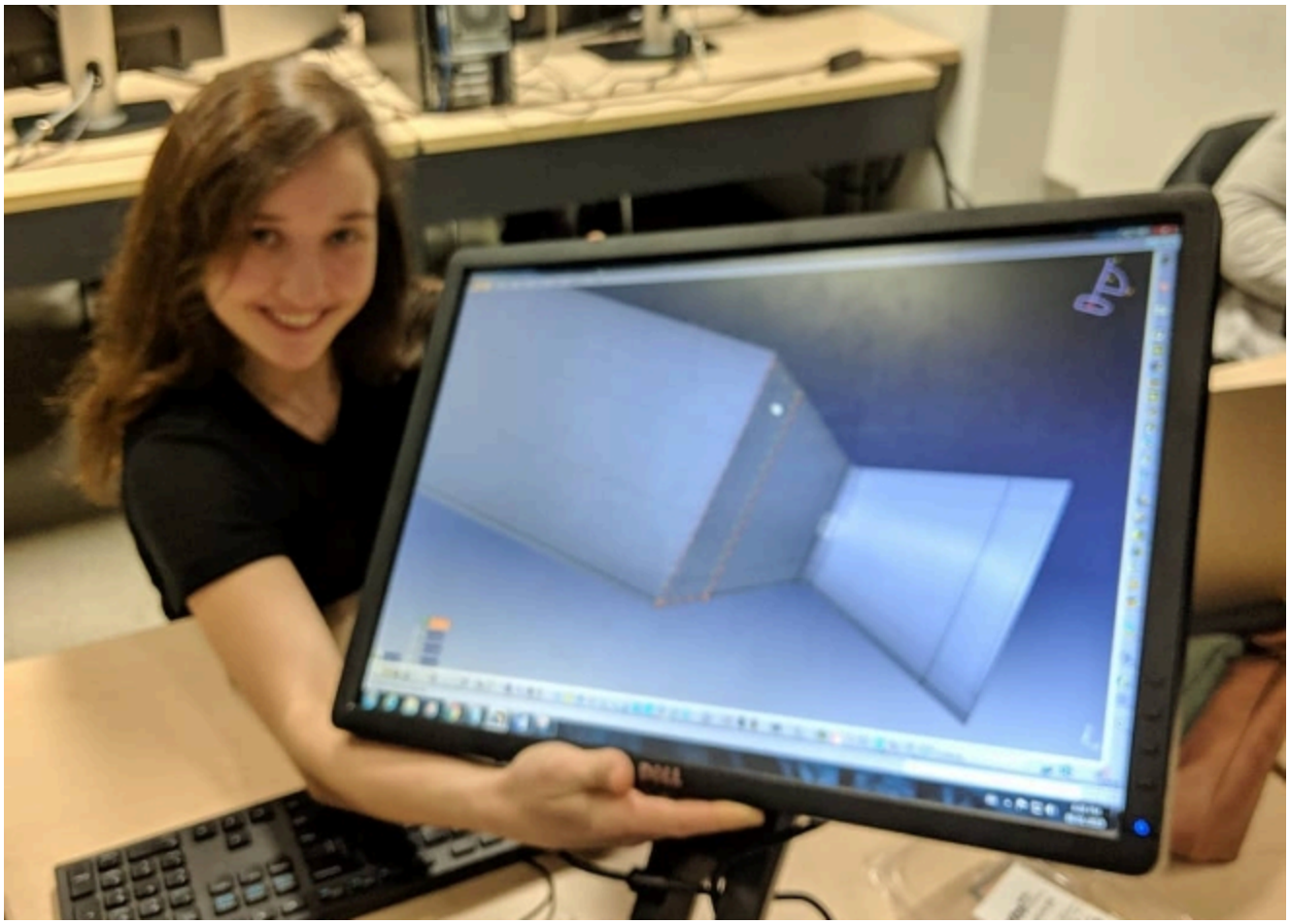
The proposal detailed their support by Adam Trumpour's Launch Canada — Trumpour himself being a former member of Ryerson's Propulsion Research Facility — and how they were going to be testing the engine at Launch Canada's test facility north of Mississauga, Ontario. It named the consultants that they were working with for the design and testing: Stein Astronautics' Dan Steinhaur, Swagelok's Tony D'Agostino — and even Canadian Space Agency Systems Engineer Michel Wander, along with others. It broke down the sponsors' information, and what sort of support (financial or otherwise) they would provide.

It was particularly explicit on the issues of testing and safety. Page after page of safety material laid out general safety requirements, examined how they would manage the specific issues with liquid ethanol and liquid nitrous oxide, and went into detail about equipment and materials management, emergency contact procedures, material fire procedures, spill procedures, whipping hose procedures, and engine fire procedures. It included detailed fault trees for all stages of engine creation, fuelling and testing, and safety-focused test procedures.

Moher and his team were confident this would address the university's concerns. They were shocked to discover that none of it seemed to matter.

Ryerson says "not enough"

Weeks passed with no answer from the university. Moher and the RPG became concerned; in order to be able to build their engine by June, they needed to begin purchasing components to verify aspects of the design, begin bench testing, and to move forward on their overall milestones. Sponsors were concerned and confused about the situation. But without an answer, they couldn't move forward.



"Our Nozzle Design Engineer Antonella showcasing our final nozzle design!!! After 4 months of design work the #ryersonpropulsiongroup is working hard this week to document our Critical Design Report! Next up? purchasing and fabrication." Credit: Ryerson Propulsion Group.

Moher was especially concerned that he could find no indication that anybody at Ryerson had actually accessed the Google Docs file for the proposal, whether to view it online or download it for offline viewing.

Moher and the RPG arranged for a meeting with the Dean of the Faculty of Engineering and Aerospace Studies. At the meeting, the Dean (in Moher's recollection) said that he was "too busy to read it", and that Launch Canada's facilities and assistance were potentially unacceptable because they were "not on university property." It was disheartening, but the Dean did say that they would wait on the analysis of a Ryerson technical advisor before making their formal decision. Moher and his team held out hope.

It took until February 28th for the University to issue its formal response. The response was from the Manager of Student Engagement. She said in the letter that she had had a conversation with the Dean — and that despite everything in the RPG proposal, they would not support the Group. Ryerson maintained that they lacked adequate facilities and resources for the project. They also maintained that they still saw the project as too risky, and the financial commitment as one that they could not afford.

Moher tried to respond to these points. He reminded the Manager that the proposal clearly laid out detailed safety procedures and had detailed both their sources of outside funding and the cost of labor and materials involved in the project. He pointed, again, to Trumpour's offer to provide testing facilities and to use his experience working with rocketry students to oversee the design, production and testing process for the RPG's new engine.

He also reminded her that, throughout the first semester, they had invited university figures to check out their design reviews, which had received support and guidance from both Trumpour and industry experts. The technical advisor's analysis was still ongoing, as well, and the Dean had (according to Moher) said that they'd respect his decision.

None of it seemed to matter. Ryerson just didn't seem to want its students building rocket engines.

"This doesn't mean anything!"

Moher and the RPG made one last attempt to reach out to the Dean and the Ryerson administration, and finally got their meeting in mid-March.

They had thought that they were well prepared. In response to the university's concerns about testing facilities, they had asked Trumpour to provide a personal letter to the Dean, verifying his association with the RPG and his commitment of time and facilities to helping the students create their engine. They had already sent it to the Dean, but they made sure to bring a copy to the face-to-face meeting, which included the Dean and a former student engagement manager, though not any scientific or technical experts.

Moher presented the Dean with Trumpour's letter. What happened next (according to Moher) shocked the RPG: the Dean appeared to take the letter and simply throw it across the table, saying "this doesn't mean anything!"

Again, the RPG tried to make their case:

- The Dean and the former manager raised concerns about resources and facilities: the RPG pointed to their various financial sponsors and mentors, the facilities that Trumpour had lined up for them, and their costed bill of materials.
- The Dean and former Manager said "U. of T. (Toronto) uses professional labs": the RPG responded that U. of T. propulsion-building is student-led, using facilities at Downsview similar to the Launch Canada facilities.
- The Dean said that "they didn't know how to manage it"; Moher said that they were "happy to provide contact information for other university teams and their supervisors and how to supervise it."
- At this, the Dean and the former Manager seemed to finally relent, saying that if the RPG got them a list of contacts at other universities, they could move forward.

Within days, that's exactly what the Propulsion Group did. They acquired and presented a list of professors at Waterloo, U.of T., Concordia, McGill, and UBC that were glad to provide guidance. One professor at Concordia was excited at the prospect of helping the RPG; another at Waterloo wanted to reach out to Ryerson to provide an improved framework for technical vetting of these kinds of projects, the kind that helped Waterloo become a world leader in training future engineers.

Moher said that the RPG forwarded the information to Ryerson. But, again, nothing happened. The school year came and went, and as this week, the RPG says that they have still heard nothing from the school about their engine.

"Insufficient evidence" says Ryerson's FEAS

When contacted by SpaceQ, Ryerson maintained their position. In response to questions on the events surrounding the RPG, the FEAS sent a statement which said that "at the time of the proposal staff at the Faculty of Engineering and Architectural Science were not provided with sufficient evidence of a partnership with Launch Canada."

This seemed to contradict the RPG's statement about having provided a letter from Trumpour to the Dean in person, and comments made by Trumpour himself at the Ontario Centres of Excellence conference that his organization was backing the RPG. When asked about this, Ryerson sent another statement that they believed that there was no access to "a safe facility" due to the lack of a "formal letter of partnership with Launch Canada", and that "a request to be connected with potential industry partners was not met". Ryerson also said that "an offer to assist with this process has been extended".

This dismissal is especially surprising in light of Trumpour being a former Ryerson graduate student, who would have had a professional relationship with the FEAS Faculty. When asked directly about Trumpour and the meeting where a letter was presented, the University replied that their statements quoted above were their final statements on the process.

It may well be that it is simply the “formality” of the letter that was in question, and that resolving this issue of formality will be part of the Faculty’s “offer to assist”. When asked, however, Moher and the RPG said they were unaware that any such offer had been made.

The RPG’s future

Regardless of all this, it would appear that the RPG may have a bright future ahead of them. When contacted by SpaceQ about the RPG situation, some of the recent graduates (launch companies) of the Creative Destruction Lab’s (CDL) Space Stream were very interested in the students and their story. At least one team said they’d probably hire them as soon as they finished no matter what happens with the RPG, reflecting the soaring demand for engineering talent in the Canadian commercial space sector.

One CDL graduate representative also said that the RPG shouldn’t give up. Bachar Elzein of Reaction Dynamics is a graduate of Polytechnique Montréal, where they had similar issues with reluctant school administrators. His advice to the Ryerson students: “you gotta keep pushing”, because “it’s not always easy to convince the school to go for it”. He eventually succeeded; maybe the RPG will as well.

And, if Ryerson's statement is taken at face value, it would appear that they haven't yet closed the door on the RPG's project. Though the school year is over, most of the RPG students will be returning next year. They can once again reach out to the university's administration, perhaps with the help of experienced people like Elzein and Trumpour and their other university contacts, and finally move it forward.

Ryerson University is intent on being considered a full competitor to more established research universities like the University of Toronto. It's a laudable goal. If achieving that goal includes helping student clubs to build rocket engines, Ryerson student clubs will eventually be building rocket engines. The only question is "when".

Update October 24, 2019 – In part due to our reporting, Ryerson University has changed its position. Here's the follow-on story: Ryerson University Reverses Course and Approves Rocketry Propulsion Group Funding.

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2019. He is a member of the Canadian Association of Journalists, and has a Master's Degree in International Security from the Norman Paterson School of International Affairs. He lives in Toronto.

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Balin Moher

January 8, 2020 at 5:15 pm

Thanks for the article SpaceQ. Hopefully this will encourage Ryerson to better accommodate student initiatives.

Problems with administration understanding rocket engineering projects has always been an issue in Canada. The fact is that not many people working in administration know how

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