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# MECH ENG 200: Writing the Technical Paper and Abstract

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# Roger Graves





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- efs

I'm new to the University of Alberta, having come from the University of Western Ontario where I was Director of the Program in Writing, Rhetoric, and Professional Communication in the Faculty of Arts and Humanities. In my new position here I'll be working with faculty and students across the university as part of the Writing Across the Curriculum initiative. I will also be working with students and faculty in the Department of English and Film Studies.

I am the author, co-author, or editor of five books and 29 articles, including *Writing Instruction in Canadian Universities*. My current research interests include the development of doctoral student writing, writing assignments across disciplinary fields, and rhetorical approaches to text encoding. Currently I serve as co-Vice-President of the Canadian Association for the Study of Discourse and Writing (CASDW) and a member of the Executive Board of the Canadian

### Recent presentations

This page contains links to pdfs of slides displayed at presentations I've given.

### Books

This page displays the covers and descriptions of books I've authored, co-authored, or co-edited



**Blog: Thinking About Writing**  
A new blog on writing-related issues

<http://www.ualberta.ca/~graves1/index.html>

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# Communication/Technical Skills

No matter how many technical skills you have, you still need to deal with people at a level they can understand, so communication skills are just as important as technical skills.

Paula Anthony, Industry technical support team leader

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# 5 Factors affecting success as a writer

1. Flexibility of your **writing processes**
  2. Ability to get **feedback** on drafts
  3. Familiarity with the **genre**, complexity of the genre
  4. Complexity of the task (**purpose**):  
description is less complex than analysis/  
synthesis
  5. Number of **audiences**/readers, diversity  
within these groups
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# Success in this course

1. **writing processes**
  2. **feedback** on drafts
  3. Familiarity with the **genre**—how many technical articles have you written? (**unknown**)
  4. Complexity of the task (**purpose**): analysis/synthesis is at top end of reasoning skills (**difficult**)
  5. **audiences**/readers—supervisor and colleagues at work (**difficult**)
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# The assignment

Technical paper based on an article from one of the following magazines:

- the ASME Mechanical Engineering,
  - SAE International's Automotive Engineering,
  - Aviation Week & Space Technology,
  - Canadian Consulting Engineer, or
  - Wind Power Monthly.
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# Components

- (1) Title;
- (2) Author's name;
- (3) Author's affiliation;
- (4) Date paper is prepared;
- (5) Abstract (maximum 150 words);
- (6) Body of the paper (length between 600 and 1,000 words, not including tables, figures and references). The body of the paper must at minimum have the following parts: Introduction, Methods, Results and Discussion, Conclusion and/or Recommendations;
- (7) References; and
- (8) There should be a minimum of two graphics or figures included in the technical paper.

**Persuasive,  
Fact-driven**

# Evaluation

Category	Checklist		Rating			
1. Structure and Format	Is the paper appropriately structured, e.g. into introduction, results, discussion and conclusions? Does the material flow from introductory to complex? Do the conclusions naturally flow from the preceding arguments?	0	1.5	2	2.5	3
2. Relevance	Does the paper deal with an engineering subject? Was the subject discussed in appropriate depth and with sufficient level of detail? Figures helpful & tech.	0	1.5	2	2.5	3



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# Deadlines

## ■ Timelines

- ❑ Draft due date is 10 am on June 21, 2012 (bring 2 copies to class)
  - ❑ Due date for return of the marked up draft by the “peer” is 10 am on June 26, 2012
  - ❑ Marked up draft Technical paper can be picked up on June, 2012 (in class)
  - ❑ Final version is due at 10 am on July 3, 2012
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# Technical Paper

- Who is your **audience** for the technical paper?  
Describe this reader.
  - What is your **purpose**?
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# Organization

- Introduction
  - Results
  - Discussion
  - Conclusion
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# Introduction

- Announce the topic and scope of the paper
- Indicate why the topic is important or worth reading about
- Identifies the problems the new technology offers a solution to
- Identifies the solution offered by the new technology

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## 1. Introduction

The use of concrete and self-compacting concrete (SCC) as a tool for effective recycling has been actively researched for the last few years. Examples of these efforts include materials derived from buildings following demolition (Diotallevi et al., 2004; Limbachiya and Roberts, 2004), scrap and ground used tires (Bignozzi and Sandrolini, 2006; Hernandez-Olivares et al., 2002; Khatib and Bayomy, 1999), waste glass (mainly binary soda-lime glass) (Bignozzi and Sandrolini, 2004; Shao et al., 2000) and residues from ceramic raw materials (Bignozzi et al., 2004). These materials were successfully used as a partial or complete replacement for natural aggregates and/or fillers. These studies have environmentally friendly consequences, such as safeguarding of non-renewable raw materials, reducing the exploitation of quarries and reducing landfill disposal, all of which result in the creation of new conglomerates with peculiar characteristics. For example, the introduction of tire rubber into a concrete mix generally leads to lighter and somewhat tougher material (Bignozzi and Sandrolini, 2006; Khatib and Bayomy, 1999). More recently, self-compacting technology has enabled the significant improvement of the mechanical strength of rubberised concrete (Bignozzi and Sandrolini, 2006). In addition, when glass waste (average grain size  $\leq 38 \mu\text{m}$ ) is added to a concrete mixture, the material may exhibit pozzolanic properties (Bignozzi and Sandrolini, 2004; Shao et al., 2000).

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# The problem: waste

- Additionally, **the various purification treatments involved in the separation process produce waste in turn.** This waste includes ceramic residues and colored glass fragments that are usually separated from the glass cullet by optoelectronic equipment. **This fraction of colored glass is usually sent to a landfill,** except in the North of Italy where it is further treated by purification processes.
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# The solution: recycle

- The objective of this paper is to investigate a new application of **mill waste** in the construction industry by exploiting its activity as filler for self-compacting concrete and as a partial Portland cement replacement (up to 50%) for newly blended cement.
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What is your problem?

Your solution?

- What is the objective of your paper?
- State it in one sentence.





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# Sample Introduction (student paper)

As mobile electronic devices become more widely integrated into society, the demand for portable energy sources has drastically increased. Conventional sources of power such as electrochemical cells are the most prevalent in the portable power market. Despite their efficiency, batteries' finite life and chemical composition causes inconveniences as well as environmental damage. Recent development of mobile energy sources has been focused on the use of kinetic energy rather than chemical energy. There is an abundance of motion energy in the form of ambient vibrations and naturally occurring motions, both of which remain largely untapped. A viable alternative to batteries has been developed to harvest unused motion energy. Motion energy harvesters are able to harness mechanical motions and convert them into useful electrical energy. However, these small scale electric generators are limited to a narrow range of frequencies, making them ineffective in many applications. A new generator developed by Veryst Engineering bypasses these limitations.

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# Results

- Present graphs and tables in this section
  - Summarize and describe
  - Present arguments to explain the data
  - Cite other research articles in this section
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# Sample published paper

## 3. Results and discussion

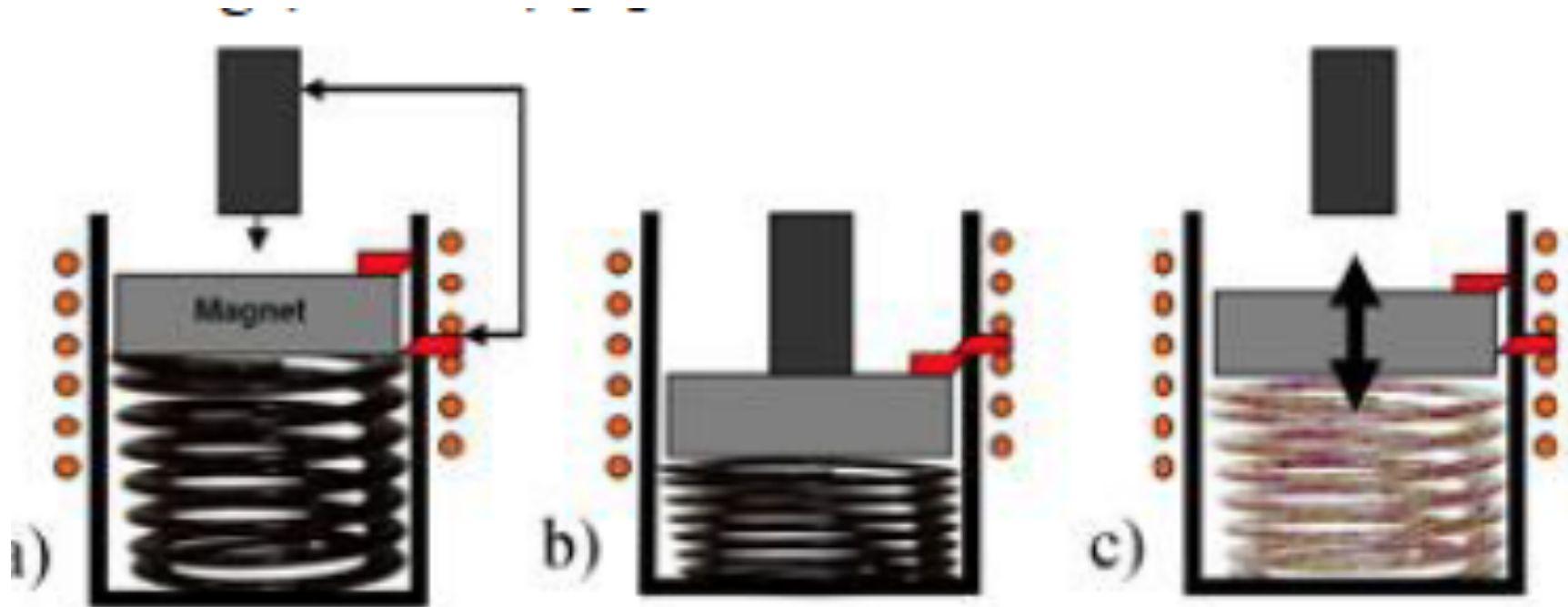
Fresh concrete results obtained for SCC-C and SCC-MW are reported in Table 1. The target values were always attained for both the Slump Flow and J-Ring tests. When MW filler was used, no segregation occurred and good cohesiveness was visually assessed. To evaluate concrete viscosity, the time required to reach a 500 mm spread diameter ( $t_{500}$ ) in the Slump Flow test was recorded. For both the formulations,  $t_{500}$  was about 4 s, which is well below the limit value of 12 s reported in the Italian standard (UNI 11041). Good reproducibility of Slump Flow, J-Ring and  $t_{500}$  results was observed for SCC-MW, prepared for each investigated hardening time according to the mix design reported in Table 1.

# Sample Results section (student paper)

## *B. New Design by Veryst Engineering*

A new concept developed by Veryst Engineering operates based on the same ideas in that it uses a magnet-spring system to produce energy through the means of electromagnetic induction. However, the magnet in this concept does not freely oscillate, but rather it is locked momentarily, and allows the magnet to oscillate independent of the input motion. The spring of the catch-and-release concept (Fig. 1) absorbs energy from input motion until a certain displacement is achieved. At this point, the spring is

# Figures in Results section



**Figure 1: Catch and Release Concept** a) spring absorbs energy from input motion b) system is latched at a fixed displacement c) system oscillates at its natural frequency

# Sample Figure

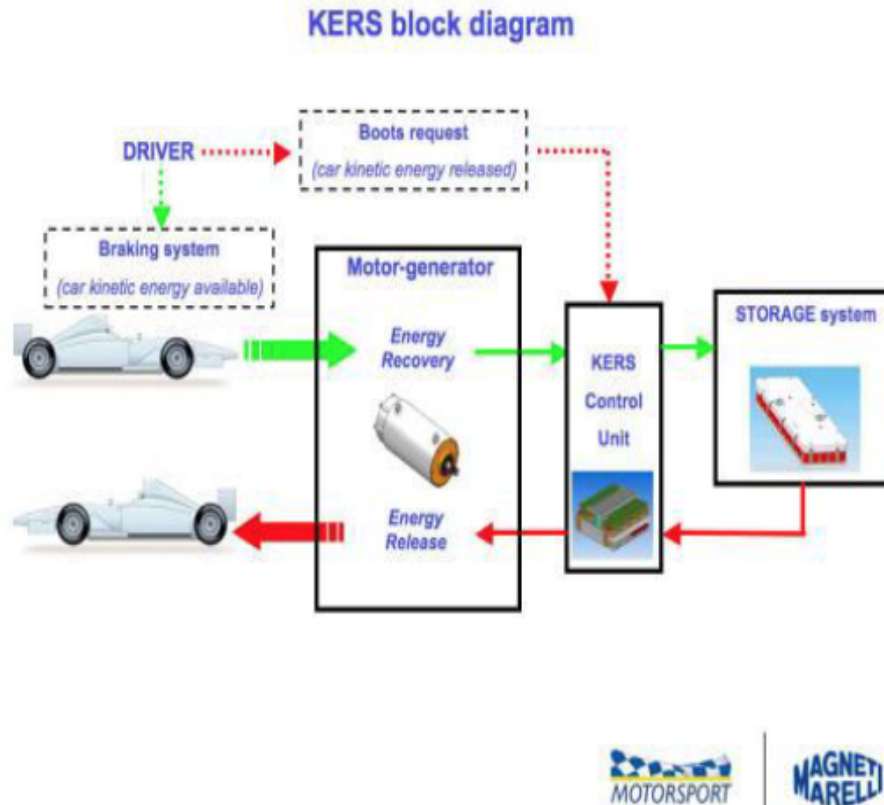


Fig. 1. The flow and conversion of energy in electrical KERS [2].

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# Discussion

- Present visual evidence in this section
  - Consider including tables and graphs to present arguments in favor of how to interpret the data
  - Present arguments that tell readers how to interpret the results
  - Cite other research
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# Sample conclusion (student paper)

- Energy motion harvesters are portable power sources which are free of chemicals. They generate electrical energy from kinetic energy via electromagnetic induction. Presently, commercial harvesters are able to harness ambient vibrations induced by machines, and other motions of high and consistent frequency. The catch-and-release concept developed by Veryst Engineering overcomes the limitations of commercially available harvesters. The system's independent oscillations allow these new harvesters to be used effectively in a broader range of applications. The new design can potentially be used to harness naturally occurring, low frequency motions. This paves the way for future medical applications such as pacemakers and medical sensors.
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# Sample Discussion (student paper)

- Mechanical energy is stored as mechanical energy in mechanical KERS. In contrast, in electrical KERS, mechanical energy is converted to electrical energy and then stored as chemical energy. Because there is no conversion between different types of energies in Mechanical KERS, they are far more efficient than electrical KERS. The flywheel used in mechanical KERS is what gives the mechanical KERS an advantage over the electrical KERS [3]. Fig. 2 shows the components of a flywheel KERS.
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# References

- How many?
- What kind?

## REFERENCES

[1] S. P. Beeby, M. J. Tudor, and N. M. White, "Energy harvesting vibration sources for microsystems applications," *Meas. Sci. Technol.*, vol. 17, pp. R175–R195, Oct. 2006. [Online]. Available: [http://iopscience.iop.org/0957-0233/17/12/R01/pdf/0957-0233\\_17\\_12\\_R01.pdf](http://iopscience.iop.org/0957-0233/17/12/R01/pdf/0957-0233_17_12_R01.pdf). [Accessed: 14 March 2012]

[2] B. S. Hendrickson and S. B. Brown, "Motion Energy Harvesting Using Catch-and-Release Mechanism," in *Energy Sustainability*, Jacksonville., FL, 2008. [Online]. [Accessed: 14 March 2012]

[3] Faraday's Law of Induction, *Tony DiMauro*," [Online] 2008. Available: <http://sdsu-physics.org/physics180/physics196/Topics/faradaysLaw.html>. [Accessed: 14 March 2012].

[4] B. S. Hendrickson and S. B. Brown, "Marvest of Motion," *ME Magazine*, September 2008. [Online]. Available: [http://memagazine.asme.org/articles/2008/september/harvest\\_motion.cfm](http://memagazine.asme.org/articles/2008/september/harvest_motion.cfm). [Accessed: 8 March 2012].

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# Hints for summarizing

- Look in the article's Introduction for the question they are asking
  - Look in the Results for the findings
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# Five Tips for Writing Abstracts

- Limit your use of technical language (jargon)
  - Define essential technical terms (def)
  - Include background information to give some context for your subject matter (backgd)
  - Provide the details that connect your topic and its significance (details)
  - Explain significance explicitly and clearly (you can't expect non-specialist readers to fill in any gaps)
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# A Slinky that Lights the Sky

NASA's polar satellite has revealed **one of the power sources behind the gossamer glow of the aurora**: Alfvén waves, oscillations in Earth's magnetic field that resemble the quivering of a Slinky toy. John Wygant of the University of Minnesota and Andreas Keiling of the Center for Space Research on Radiation in Toulouse, France, used Polar's instruments to study energy flowing along the lines of the geomagnetic field. "Field lines have a certain tension. Charged particles are tied to those lines, so when the field wiggles around, they wiggle too," Wygant says. **Magnetic waves moving along those lines can catch electrons and accelerate them to speeds up to 30,000 miles a second. Eventually the particles crash into air molecules, giving up their energy in the form of the green, blue, red, and violet light of the aurora.**

Wherever Keiling and Wygant detected a powerful electromagnetic wiggling, the associated field lines led down to a region of aurora. Polar's instruments also showed that the energy in each electron stream was proportional to the intensity of the display. **Similar Alfvén waves may transport energy away from the surface of the sun, heating the solar atmosphere to millions of degrees.** (196 words)

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# Source

- A. S. Brown. (2011, May). From Whales to Fans: A second look at a piece of sculpture led to a promising technology. *Mechanical Engineering Magazine Online*. Available: [http://MEMMagazine.asme.org/Articles/2011/May/From\\_Whales\\_Fans.cfm](http://MEMMagazine.asme.org/Articles/2011/May/From_Whales_Fans.cfm).
  - Keywords: lift, drag, airfoils, aerodynamics, fluid dynamics, vortices
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# Sample Abstract

- “From Whales to Fans” describes the inspiration for a new technology that improves the performance of airfoils by improving lift without increasing drag. The technology resulted from the observation that humpback whale flippers have bumps on the leading edge, the edge that on airplane wings is smooth in order to produce a smooth, aerodynamic flow of air. Using 3-d models of the whale flippers, the authors were able to demonstrate through a variety of experiments that the tubercles improved lift and postponed stall. The vortices that developed as a result of the tubercles caused the airflow to adhere longer to the surface of the wing. When these principles were subsequently applied to fans and turbines, the results included less air stratification, higher efficiency through improved airflow, and lower costs (up to 20% savings).
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# Looking ahead: Drafts of reports

- Use the C4W as a resource to get feedback before handing in final drafts
  - Work hard at developing broad writing skills to handle the challenges of writing at work and in academic settings
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**Welcome back for the Fall 2009 term! Tutoring hours will begin on Monday, September 14. The online appointment-booking schedule will be available to clients as soon as possible prior to this date. We look forward to working with you!**



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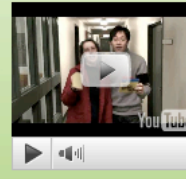
### Express News

#### Twitter Updates

The Centre for Writers will open for the fall term on Monday, September 14! 5 days ago

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