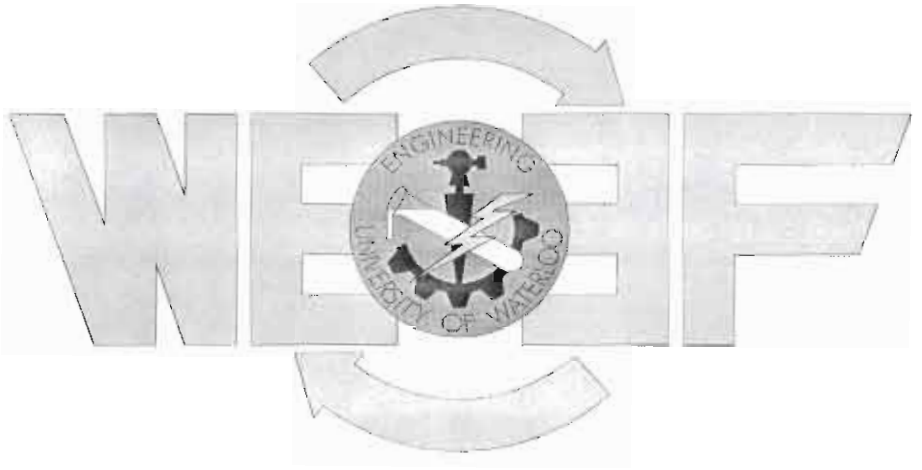
Waterloo Engineering Endowment Fund



Spring 1998 Proposals

MASTER COPY

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	Sub-Total Student Groups	$34,966.19
	TOTAL	$378,159.67

1. Upgrading an Undergraduate Laboratory Experiment

Submitted By:

Siva Ganeshalingam
Email: Sganesh@engmail.Uwaterloo.Ca
Phone Number: 6161
Position: Senior Technician

Description of Proposal:

We would like to **modify an existing experiment, currently performed by 4A students in their 040 Laboratory course**. This is an experiment on ABSORPTION, which is an important Unit Operation in Chemical Engineering.

Instead of absorbing acetone vapour, we like to modify the experiment to absorb sulphurdioxide. Sulphurdioxide is a gas that causes **acid rain** which is a serious **environmental problem** in North America.

The department agreed to provide everything except the mass flow meters, Gas Chromatograph and a suitable detector.

We have already purchased the Gas Chromatograph through **WEEF funding** approved last term. We need to buy a special detector called **Flame Photometric Detector** to analyse for sulphurdioxide and **Mass Flow Meters** to measure the flow rates of sulphurdioxide and air. I request funding for the purchase of these two items.

Proposal Benefits:

Since acid rain is an environmental problem and the way to remove sulphurdioxide is a common separation process in Chemical Engineering, all the students in both Chemical and Environmental courses can use this setup to do experiments. For example

First year students could determine the percentage sulphurdioxide removal and subsequently do experiments to observe the effect of flow rate and inlet gas composition on the removal efficiency.

Second year students in their Fluid Mechanics Laboratory course could investigate the flooding characteristics of a packed column.

By introducing a suitable catalyst in the system, this unit could be converted to an experiment on catalysis for the fourth year students.

Cost Breakdown:

Detector: Model—SRI Flame Photometric from CHROMATOGRAPHIC SPECIALTIES.
Cost: $ 6112
Number required: One

Mass Flow Meters

Sulphurdioxide: Model FMA 1828 from OMEGA ENGINEERING
Cost. $ 1200

Number required: One

Air: Model—FMA 1828 from OMEGA ENGINEERING.
Cost: **$ 851**
Number required: One

Socket plug in power supply: Model—FMA 178 PW from OMEGA ENGINEERING
Cost: $ 56
Number required: Two
Total cost: **$ 112**

TOTAL COST OF EQUIPMENT: $ 8275
Taxes, shipping etc @ 15%: $ 1241

TOTAL FUNDING REQUESTED FROM WEEF: $ 9516

Implementation Schedule:

As soon as possible

Additional Information:

The department has agreed to provide whatever the labour cost involved in the installation of this units.

2. Microscopes for Undergraduate Laboratories

Submitted by:

Name: Lillian Liao
E-mail: LLiao@engmail
Phone: X6161
Position: Analytical Chemist

Description of Proposal:

To purchase 4 microscopes for use in ChE032 Introductory Biotechnology, and EnvE331 Instrumentation and Analysis undergraduate laboratories.

Benefits of the Proposal:

Approximately 160 students equally distributed between Chemical and Environmental Engineering would greatly benefit from the purchase of the proposed equipment. Enrollment of the Environmental Engineering program is increasing each term.

Compound microscopes are a basic tool used for visualization of the detailed structure of microorganisms. A working knowledge of cell growth and function is required in order to understand and analyze processes of biotechnology. This becomes important in the design and operation of bioprocess systems (bioreactors, product recovery, etc.). Currently there are insufficient numbers of microscopes to accommodate for the number of laboratory groups. It is hoped that with the additional microscopes the number of students that make up one lab group can be reduced which would allow each student to have more time in using the instrument.

Cost Breakdown of Proposal:

	Item	Price	Use	Description
4	Microscopes	$2,846.00	to examine microscopic organisms	Nikon Alphaphot 2 6V –20W phase contrast
	Total amount	$11,384.00		

Implementation Schedule for Project:

Equipment will be used once available.

Additional Information:

Partial funding option would be to purchase half the number of microscopes ($5,692.00). Requesting the second half in next term's WEEF submission.
All prices are current and include taxes.

3. Lab for Undergraduate Chemical Reactor Engineering Course

Submitted By:

Your Name: Brian Barclay, Jamie Novis
E-mail: brbarcla@engmail, jnovis@engmail
Phone Number: 519-746-6942 / 519-885-1116
Position: 4A Chemical Engineering

Description of Proposal:

As part of a 4th year design project, we plan to design, build, and implement into the curriculum (to supplement the CHE 036 reactor design course) a laboratory that demonstrates several fundamental principles of reaction engineering. Currently, no labs (demonstration or otherwise) exist to supplement this highly applied course. The Chemical Engineering department Chair and several Chemical Engineering professors have displayed strong interest and support in this project (including the professor who normally teaches the Reaction Engineering course).

Proposal Benefits:

It is the opinion of many students that the Undergraduate Chemical Engineering curriculum is severely lacking in applied laboratories until the 4th year level is reached. This lab would begin to fill this gap and since the Reaction Engineering is a third year core course in the curriculum, all students in Chemical Engineering would benefit from its implementation

Cost Breakdown:

Two Cole/Palmer Pumps = $2100
Two 1 L Round bottomed 3-neck flasks = $200
Agitator, motor, and speed controller = $1000
Conductivity Meter with 3 inputs = $2379.71
Materials for construction of reactor support = $200
Various valves, tubing, piping, fittings, and clamps = $500
Various glassware (beakers, flasks, pipettes, graduated cylinders) = $500

Total Estimated Cost = $6879.71
Chemical Engineering Department Contribution = $500
WEEF Funding Requested = $6379.71

Implementation Schedule:

The lab would be implemented in the spring or fall of 1999 within the CHE 036 course (Reaction Engineering for Chemical Engineers).

Additional Information:

Another lab for the CHE 036 course, which is fully funded, is currently being designed and built.

4. CDROM server for Civil Polaris

Submitted By:

Your Name: Michael Herz
E-mail: mherz@uwaterloo.ca
Phone Number: x3411
Position: Computer Systems Manager

Description of Proposal:

Supply and install a 4CDROM server for the Civil Engineering undergraduate environment.

Proposal Benefits:

We currently have no way to serve CDROMs on Polaris. This issue has surfaced a few times and we currently have a requirement to put the National Construction Codes online for CIVE415 Structural Systems. This server would allow for up to 4 CDROMs to put online simultaneously.

Cost Breakdown:

$3,200.00

Implementation Schedule:

Immediate.

Additional Information:

5. Survey Equipment Upgrade

Submitted By:

Your Name: Neil R. Thomson
E-mail: nthomson@uwaterloo.ca
Phone Number: x-2111
Positio' Associate Professor, Department of Civil Engineering

Description of Proposal:

Surveying is an important skill for Civil, Environmental, and Geological Engineers. Many co-op jobs require a surveying background, and graduate engineers often need to work with surveyors. The Department of Civil Engineering presently has 22 transits that vary in quality and age. In the fall of 1997 two new courses were offered: Civ E 125 Introduction to Civil Engineering, and Env E 100 Environmental Engineering Concepts 1. Both of these courses involve field work using transits. This proposal is for the purchase of six (6) new transits to replace six worn out transits.

Proposal Benefits:

The purchase of these new transits will allow first year students (approximately 145 students in the Civil, Environmental (Civil), and Geological Engineering Programs) to work with modern equipment, and hence will avoid the equipment related problems that were encountered during the initial offering of these two courses.

Cost Breakdown:

6- Sokkia Transits[1] (model KT-5)	6 x $1165.00/each =	$6990.00
	GST+PST =	$1048.50
	Total Cost	$8038.50
Contribution from First Year Engineering		$1000.00
Contribution from Department of Civil Engineering[2]		$2000.00
	Requested WEEF Funding	$5038.50

[1]If ordered from Japan and shipped by boat (30 day delivery) six tripods will be added at no charge.
[2]The Department of Civil Engineering will contribute at a rate of 40% of the WEEF Funding amount up to a maximum of $2000.00.

Implementation Schedule:

These transits will be used during the fall 1998 term in Civ E 125 and Env E 100 (Civil).

6. Traffic Engineering Simulation and Design Software

Submitted By:

Your Name: Bruce Hellinga
E-mail: bhellinga@uwaterloo.ca
Phone Number: Ext. 2630
Position: Assistant Professor

Description of Proposal:

Purchase of multi-user licenses and supporting documentation for two state-of-practice traffic engineering software packages, namely TRANSYT/8 used for the optimisation of traffic signal timing plans for co-ordinated networks, and TSIS a microscopic traffic simulation model developed by the US Federal Highway Administration for evaluation integrated signalised and unsignalised road networks.

Proposal Benefits:

These software models are two of the most widely used packages by practitioners for the analysis and design of traffic controls. These models will be used by students of two 4th year undergraduate technical elective courses in Civil Engineering, namely CivE440 and CivE443. The use of these models will enable students to evaluate and design solutions for more realistic traffic engineering problems than is currently possible using only manual techniques. Furthermore, students will be exposed to software that is widely used in government agencies and private firms in Canada, the US, and internationally.

Cost Breakdown:

TRANSYT/8:		
Multi-User Single Location Site License (Educational Price) $US 250		$372.50
Documentation	First copy US$40	59.60
	Additional 3 copies (US$36/each)	160.92
TSIS:		
Multi-User Single Location Site License (Educational Price) $US 500		$745.00
Documentation:	First copy US$20	29.80
	Additional 3 copies (US$18/each)	80.46
Processing Fee:	(US$10)	14.90
TOTAL		$1,463.18
Departmental Contribution		-600.00
WEEF Application TOTAL		$863.18

Implementation Schedule:

Software is to be used beginning in the upcoming Winter term, in CivE440.

Additional Information:

- Multi-User education license permits installation of software on Waterloo Polaris
- Normal non-educational cost of these licenses would exceed $28,000.

7. Auto Bode --- Circuit Analyzer

Submitted By:

Your Name: Ed Spike
E-mail: spike@engmail.uwaterloo.ca
Phone Number x3716
Position: Laboratory Instructor

Description of Proposal:

To add ten Auto Bode stations for automation of experiments in the Electrical and Computer Engineering Department. The Auto Bode Circuit Analyzer workstation will allow for automated measure of the frequency response of test circuits. Both the phase and the voltage gain can be measured and plotted.

Proposal Benefits:

The three hour experimental measurement can be reduced to a one hour measurement in the E&CE-241 and in the E&CE-332 course. Introduction in the E&CE-241 course will help with the learning curve in the courses beyond the 2B term.
E&CE-380 and E&CE-481 courses can use four shared units to reduce the demand for the existing six workstations. The existing six Auto Bode Workstations are in high demand in courses E&CE_380 and E&CE-481 and often have schedule conflicts with the other courses.

Cost Breakdown:

	Each	10 units
Cart for mobility of workstation		
(U of W shop)	$298.00 plus taxes	$2980.00
Phase Gain Meter		
Model HP-	$4000.00	$40,000.00
Signal Generator Card		
E&CE-shop assembled	$400.00	$4000.00
Digital Card. A to D Dash-08	$ 396.00	$3,960.00
Computer (supplied by E&CE-Dept)		
Surplus @ WATSTAR upgrade	no cost	no cost
Power Bars		
ElectroSonic	$30.00	$300.00
Plastic Conduit		
ElectroSonic	$14.00	$140.00
Total	$5,138.00	$51,380.00

Implementation Schedule:

To be ready for fall 1998.

Additional Information:

Software and computers are available now.
Signal Generator board assembly done by E&CE-shop. Dash-08 board modified by E&CE-shop.

8. Printed Circuit Board Milling Unit

Submitted By:

Your Name: Ed Spike
E-mail: spike@engmail.uwaterloo.ca
Phone Number: x3716
Position: Laboratory Instructor

Description of Proposal:

The milling of copper cladding from the printed circuit board will allow for a non-chemical process. The milling unit can us AutoCAD type computer files. Cutting head depth position can be adjusted for the various thickness of the copper cladding on the circuit board substrate. Cutting with minimum is 0.006 inches.

Proposal Benefits:

Users from all Engineering departments will have a facility to produce one-off circuit boards after proofing the layout on AutoCAD (and other layout software).

Chemical etching requests from many Engineering groups have been turned down in the past due to the demand on the supervising staff's time and due to the safety factor in using the chemicals. The dependence on chemicals would be removed. Minimum setup training would be required

Previous requests from:

-Courses E&CE-473 and 474.
-Systems Design undergrad projects.
-Fourth year projects in E&CEng., Mechanical Eng., and Systems Design Eng.
-Solar Car
-Baha Car
-Robotic automation undergrad projects.

Cost Breakdown:

Model QCS-5000	$17,230.00		
Taxes	$2,584.50	SubTotal	$19,814.50
Standard Materials Kit AS-Kit-STD	$ 426.00		
Taxes	$ 63.90	SubTotal	$ 489.90
		Total	$20,304.40

Implementation Schedule:

To be ready for fall 1998.

Additional Information:

All users would be asked to cover the cost of milling bits and copper clad board used.
Software and computers are available now.
Quote attached.
Vacuum cleaner and safety shield to be supplied by E&CE Dept.
Printed Circuit Board stock to be purchased and kept by E&CE Dept.

9. RF Workstation additions --- Signal Generators and Slotted Lines

Submitted By:

Your Name: Ed Spike
E-mail: spike@engmail.uwaterloo.ca
Phone Number: x3716
Position: Laboratory Instructor

Description of Proposal:

Additional signal generators and slotted lines will be used to complete the workstations.
The four additions will complement the existing six workstation which have the same frequency range.

Proposal Benefits:

The additions will allow for the E&CE-471 course experiment two to have 12 workstations. And experiment three will have (6+4 additions) ten workstations. The increase of four student groups will enhance the scheduling of the laboratory work. And the staff support will be given more effective and efficiently.

Cost Breakdown:

		Each	4 units
Source:			
Gen. Radio Model	1361A	$650.00	$2600.00
Power supply for Model 1361A			
Gen. Radio Model	1264A	$525.00	$2100.00
Slotted Line			
Gen. Radio Model	874-LBA	$650.00	$2600.00
Sub Total in US dollars		$1,825.00	$7,300.00
Sub Total in Cdn dollars (x1.42)		**$2,591.50**	**$10,366.00**
Taxes		$388.73	$1,554.90
Slotted Line Mount			
E&CE Dept or Eng Machine Shop		$200.00	$800.00
Total		$3,080.23	$12,720.90

Implementation Schedule:

To be ready for fall 1998.

Additional Information:

VSWR meter model HP-415A are available for the four workstations.
Coaxial cables, filters, T-junctions, and special air line exist.
This course has been under funded for many years. The computer additions used some of the replacement and update funds.

10. Digital Electronic RLC Bridge

Submitted By:

Your Name: Ed Spike
E-mail: spike@engmail.uwaterloo.ca
Phone Number: x3716
Position: Laboratory Instructor

Description of Proposal:

Additional Digital Electronic RLC Bridges will complete the workstations for one experiment in E&CE-100. Courses E&CE-241 and 332 will benifit from the reduce waiting time to measure the component values at the start of a laboratory session.
The ten additions will complement the existing two bridges used in the E&CE-241 and 332 laboratories. The E&CE-100 course uses the older analog bridges. More work stations are needed in the E&CE-100 experiment.

Proposal Benefits:

The additions will allow for the E&CE-100, 241, and 332 courses to operate with increased efficiency. Student time waiting for a workstation will be reduce. And the staff support will be given more effective and efficiently. The E&CE-100 course will have a doubling of the number of workstations for the parallel plate capacitor experiment.

Cost Breakdown:

	Each	10 units
Gen Radio Model 1657 Digital Bridge	$975.00	$9,750.00
Sub Total in US dollars	$975.00	$9,750.00
Sub Total in Cdn dollars (x1.42)	$1,384.50	$13,845.00
Taxes	$207.68	$2076.75
Total	$1592.18	$15,921.80

Implementation Schedule:

To be ready for fall 1998.

Additional Information:

E&CE-100 has additional capacitors built.
E&CE-241 and 332 will be using the Bridges when the 100 course is not using them
E&CE-241 course will have a minimum of 10 minutes reduction for each student for each of two experiments (20 minutes total)

11. E&CE 4th Year Room Computer Upgrades

Submitted By:

Your Name: James Thai and Greg Szczeszynski
E-mail: jthai@engmail, ggszczes@engmail
Phone Number: 519-884-9938, 519-746-6629
Position: Class Reps

Description of Proposal:

Upgrade the Polaris computers in the E&CE 4th year room.

Currently, there are two 486-class computers in the 4th year room (previously funded by WEEF) which are incapable of being upgraded to Polaris (Windows 95) due to their minimal system configuration. All computers in the faculty must be upgraded from Watstar to Polaris as of Sept 1st, 1998. We are proposing for WEEF to provide funding to keep these machines operational.

This proposal is part of a larger plan to upgrade all four computers in the 4th year room. (See additional information)

Proposal Benefits:

All 4th year electrical and computer engineering students (about 130 or 200 students, depending on the term). Will also will help reduce demand for public Polaris rooms.

The old systems will be given to the E&CE dept, as some machines used by staff members and in the labs are still 386 computers.

Cost Breakdown:

We would like WEEF to provide funding to upgrade these computers to a departmental recommended Polaris configuration of:

Pentium II-266 Mhz
64 MB SDRAM
4.3 gig HD
32x CD
17" Monitor
+ standard items (keyboard, mouse, etc)
Current market price (as of June 29th) is $1849 + tax = $2126

For two computers, $4252.

Partial Funding Options.

Choice 1: Two Computers Totaling $4252
Choice 2: One Computer Totaling $2126

Funding for two computers would be MUCH preferred, since that would allow us a complete upgrade of the 4th year room.

Implementation Schedule:

As soon as possible. The upgrades must be done before the end of the school term, as Watstar will be completely phased out by Sept 1st, 1998.

Additional Information:

We are doing a complete upgrade of all the 4th year room computers to bring them up to current standards.

Current Configuration:

2 486-100MHz
2 Pentium 100MHz

Proposed Upgrades:

2 Pentium II 266 MHz Machines to replace the 486 machines – Funded by WEEF
1 Pentium 233 MHz Machine to replace 1 Pentium 100 – Funded by the E&CE Dept
1 Hard Disk and Memory Upgrade for 1 Pentium 100 – Funded by a donation by Research in Motion (RIM)

12. Sunee Monitor Replacement

Submitted By:

Your Name: Mattias Hembruch
E-mail: mghembru@ece.uwaterloo.ca
Phone Number: x6165
Position: Lab Technologist E&CE

Description of Proposal:

Sunee currently has 9 machines with monitors that are between 7 and 9 years old. Several monitors from this group have had to be retired, and at least one or two repaired. We expect that within the next 1 or 2 years, several more of these units will fail, and the quality of most of them will degrade. We want to take a proactive stance and replace them before they fail.

Proposal Benefits:

Fourth year E&CE students using sunee.
Courses: E&CE 427, 450, 451, 452, 453, 456, 457, 481.
All Sunee machines will have recent 17" monitors, rather than some old and some new(er) monitors as they currently have. New Sun machines accept PC style monitors, so it makes it easy to upgrade Sunee in the future to newer Sun machines, when funding becomes available.

Cost Breakdown:

9 ADI 5G 17" monitors ($512 each + taxes = $565.25)
9 13W3F to HD15M video adapters ($51 each + taxes = $56.31)

9 * (565.25 + 56.31) = 9 * $621.56 = $5594.04

Implementation Schedule:

As soon as monitors and cables arrive. (August 1998?)

Additional Information:

Partial funding accepted, any number of monitors.

13. Uninterruptable Power Supply for Waterloo Polaris Servers

Submitted By:

Your Name: Roger Sanderson
E-mail: rsanders@ece.uwaterloo.ca
Phone Number: Ex. 6184
Position: Lab Technologist

Description of Proposal:

Purchase an Uninterruptable Power Supply for E&CE's Waterloo Polaris/Watstar servers and ethernet switches.

Proposal Benefits:

With the introduction of Waterloo Polaris, ethernet replacing Token Ring, and increased disk capacities, the Watstar/Waterloo Polaris servers in the E&CE Dept. have become increasingly prone to problems caused by power outages and power glitches. The UPS will minimize downtime caused by summer storms and other power problems. Just the other week, a power bump caused the servers to go down, and it took at least half an hour to get them back online. This proposal would benefit all Waterloo Polaris users that use E&CE machines.

Cost Breakdown:

American Power Conversion SU1400NET, $904.65 + tax = $998.74

Implementation Schedule:

August 1998 if possible.

Additional Information:

14. E&CE 486 Upgrade

Submitted By:

Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:

Upgrade (add a 2.6G harddrive + 10Mbit ethernet card) one machine in various E&CE labs to allow access to the intra/internet. This includes the following labs:
E2-3342 (Microwave), E2-3347 & E2-3348 (Electronics), E2-3339 (Communications),
E2-3362 (Fiberoptics), E2-3344 (Instruments), E2-3362 (Networks), E2-2356 & E2-2363 (Digital)

Proposal Benefits:

Allow computer access in a room that has lost all network access due to outdated computer equipment.

Cost Breakdown:

$232 per machine for a 2.6G hard drive + ISA ethernet card.
Upto 9 rooms * $232 + tax (10.4%) = $2305.15
Any number of upto 9 is acceptable.

Implementation Schedule:

immediate

Additional Information:

15. E&CE Digital Lab. Pentium Upgrade

Submitted By:

Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:

The E&CE Dept. has closed two rooms (E2-2356, E2-2363) because the computers are not capable of running Waterloo-Polaris and not worth upgrading.
The proposal is to purchase Pentium 200MMX computers and 17" monitors for each station

Proposal Benefits:

Allow the E&CE Dept to open the following labs:
E2-2356 (24 stations) for E&CE 223 (240 students/yr), E&CE 427 (200 students/yr) and general E&CE 222, 324, 354 use.
E2-2363 (18 stations) for E&CE 222 (90 students/yr), E&CE 354 (165 students/yr).

Cost Breakdown:

$1,385 per P200MMX computer and 17" monitor
Upto 30 units * $1385 + tax (10.4%) = $45,871.20
Any number of units (even exceeding 30) is acceptable.

Implementation Schedule:

Mid fall 1998

Additional Information:

12 pentiums have already been purchased for E2-2363 but until more network topology changes are implemented the machines can not be installed. Hence the mid-fall 1998 install date.

16. E&CE Monitor Upgrade

Submitted By:

Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:

Upgrade the 20 monitors in the E&CE Dept. public computer rooms (E2-2360, E2-2362). They are currently 15" and I am proposing that they be upgraded to 17" while the 15" ones are used to replace the ten year old 14" Aamazing monitors in our labs.

Proposal Benefits:

Give the E&CE Dept. general access rooms better monitors for Waterloo-Polaris and improve laboratory monitors which are not very usable with Win 95.

Cost Breakdown:

$487 per monitor.
Upto 20 monitors * $487 + tax (10.4%) = $10,752.96
Any number of monitors upto 20 is acceptable.

Implementation Schedule:

immediate

Additional Information:

17. E&CE Ethernet Upgrade

Submitted By:

Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:

Upgrade the 20 pentiums in the E&CE Dept. public computer rooms (E2-2360, E2-2362) and 8 E2-3339 lab pentiums to ethernet. Support for the old token ring network is being dropped May 1, 1999 and these machines have to be moved to ethernet. The E&CE Dept. is picking up the cost of wiring the rooms for ethernet.

Proposal Benefits:

This will improve the network speed of the machines by aprox. 30% and even more when we move to 100Mbit.

Cost Breakdown:

$77 per ethernet card (SMC 9432) + $130 per hub (one hub per 8 machines).
Upto 28 ethernet cards * $77 + 4 hubs * $130+ tax (10.4%) = $2954.30
Any number of ethernet cards upto 28 is acceptable.
Any number of hubs upto 4 is acceptable

Implementation Schedule:

Late fall 1998

Additional Information:

18. E&CE Ethernet switch for the E2 3rd floor

Submitted By:

Your Name: Eric Praetzel
E-mail: praetzel@ece.uwaterloo.ca
Phone Number: ext. 5249
Position: Lab. Staff

Description of Proposal:

The computers in the 3rd floor of Engineering 2 E&CE labs all use the old token ring network cards. Before May 1, 1999 they must move to ethernet. The labs on the 3rd floor are too far from our current switches to allow us to feed ethernet to the labs. This switch would distribute ethernet to the 7 labs, 7 offices and the 4th year E&CE study room in addition to the 3rd floor network printer.

Proposal Benefits:

This will allow us to connect our E2 third floor computers to the university computer network.

Cost Breakdown:

Baystack 16 port 100Mbit switch: $2,725 + 10.4% tax = $3,008.40

Implementation Schedule:

mid fall 1998

Additional Information:

19. PGC AND SPME AUTOSAMPLER FOR THE ENVIRONMENTAL ENGINEERING LAB

Submitted by:

Bruce Stickney (Lab Technician)
email: bstickney@civoffice, ext. 2908
Susan Andrews (Assistant Professor)
William Anderson (Assistant Professor)

Date Prepared: June 26, 1998

Description of Proposal

To acquire a Varian autosampler, and appropriate software, suitable for use with the existing Hewlett Packard Gas Chromatographs (GCs) located in the Environmental Engineering lab, and also appropriate for Solid Phase Micro-Extraction (SPME)

Benefits of Autosampler

Gas chromatography is a standard analytical technique for the measurement of numerous environmental contaminants (pesticides, PCBs, dioxin, etc.). As a standard technique, it is one which is used extensively for the analysis of samples studied in the labs of several environmental and geological engineering courses (particularly EnvE 330 and EnvE 331). Analysis of these samples from start to finish by the students themselves is not always appropriate in that it takes a certain amount of experience with the techniques to consistently generate reliable data. So if the resulting data is the most important part of the analysis (for input into a numerical model, for example), it is typical that laboratory technicians will perform the GC analyses and provide the data to the students. With the introduction of the Environmental and Geological Engineering Programs in recent years, greater demands have already been placed on the technicians, and with the availability of mechanical autosamplers this activity is an unnecessary burden on the technicians' time.

SPME is a state of the art Gas Chromatographic method which offers advantages over extraction techniques currently used to detect and quantify the presence of organic compounds. SPME offers significantly lower detection limits (up to three orders of magnitude), while allowing for smaller sample sizes and elimination of expensive and hazardous solvents. This method is useful for all lab users dealing with organic compounds, and would be of particular benefit to students in EnvE 330 and EnvE 331.

The purchase of the Varian autosampler will offer:

1. Greater accuracy by removing human error.
2. A larger number of samples to be analyzed. Manual injections require uninterrupted attention, while autosampler injections can be run day and night with minimal attention.

3. Savings would be realized in technician time: taken away from other duties such as assistance to students with projects, etc.
4. Improved safety Both personal and laboratory safety is of concern as large volumes of samples and solvents, and multiple GC users, often require operators to work late into the night.
5. Minimized costs for SPME corresponding with solvent use and waste disposal associated with the solvent extraction technique.
6. Both SPME and liquid injections, and therefore will be useful for SPME samples as well.

Use of Proposal

There are several bodies of users who would benefit from this autosampler, including:

1. Undergraduate students - ENVE 331: approximately 45 students per year
   - ENV E 330: approximately 45 students per year
   - Students in CIVE/ENVE 126, CIVE 300, CIVE 400, CIVE/ENVE 401, ENVE 430 and ENVE 431 projects: approximately 20 students per year
2. Water Resources and Chemical Engineering graduate students: this number is variable but there is a likelihood that a body of expertise will develop which would be an asset to Undergraduate Students.

Cost Breakdown of Proposal

Item	Cost
Varian 8200CX Autosampler	21,833.28
HP 5890 Installation Kit	1,208.63
Installation	1,400.00
Subtotal	24,441.91
Less 10% Educational Discount	2,444.19
Total	21,997.72

Other Financial Sources

The Chemical and Civil Engineering Departments foresee using this autosampler regularly and have offered to contribute to its purchase:

$ 11,000.

20. Visualising the Earth

Submitted By: Jean Hutchinson, Jim Barker, Cheryl Petrie (Media Library)

Your Name: Jean Hutchinson
E-mail: hutchins@sciborg.uwaterloo.ca
Phone Number: 888 4567 ext. 6770
Position: Assistant Professor, Earth Sciences: Cross-Appointed to Civil Engineering

Description of Proposal:

Videos are an exceptional teaching tool for topics in Engineering Geology and Introductory Geology (Geo E 126, Civ E 253). The National Geographic Society, NOVA, TLC and many other organizations produce superb quality videos about Earth processes and events such as Volcanoes, Earthquakes and Landslides, among many other topics. The University of Waterloo's AV library contains a number of Engineering Geology videos, but most are several, if not many years old. With the requested WEEF support, I propose to purchase a number of additional videos to be placed in the AV library for use in Geo E 126, Civ E 253, Earth 437 and 438, and any related other courses.

Proposal Benefits:

The benefits of purchasing education geology videos include:

- Footage and explanation of impressive, large-scale geological processes: for example, volcanoes are far more interesting in full-scale eruption as shown on a video than as a series of sketches.
- Exposure to current concepts in the world of geology and geotechnical engineering.
- Supplementation of lectures with alternative media.

Cost Breakdown:

	Full Suite of Videos	Highest Priority Purchases
Total Cost of Videos:	$ 3896.32	$ 1856.57
AV Centre Contribution:	$600.00	$600.00
Total funding request from WEEF:	*$3296.32*	*$1256.57*

Implementation Schedule:

Should this proposal be approved, the videos would be purchased immediately, to be shipped directly to the AV library, where they will be available to anyone to borrow.

Additional Information:

I have shown videos in GeoE 126 this summer, including an excellent NOVA special entitled "In the Path of a Killer Volcano: Mount Pinatubo". Some of the comments from my 1B Geo Eng students regarding the use of videos in class are given below.

Caroline Amyot: "I think videos for class are a great idea. It is a nice change from lectures and overheads every once in awhile. Videos also provide a good visual feel for some of the more complicated topics which can be hard to show in pictures. I especially enjoyed the first video we watched. The video really made an impact on me. Even though I had read about, and seen pictures about the destructiveness of volcanoes, the video helped me to understand more about the magnitude of the destruction."

Jim Vlasblom: "I like the class videos. Sometimes a one hour video can be as effective as a one hour lecture, because you can actually see what is happening."

Chris Gardner: "The Pinatubo video was very well done and informative, along with being nice and recent. Besides, we love to see the American military running away from things. If you could find the long runout landslide video from the Discovery Channel, that would be an excellent addition the mass wasting chapter."

21. Teaching Equipment for Thermodynamics

Submitted By:

Name: **Roy Pick**
E-mail: **rjpick@mechoffice.watstar.uwaterloo.ca**
Phone Number: **888 4567 extension 3427**
Position: **Professor and Chair, Mechanical Engineering**

Description of Proposal:

We propose the purchase of an *air conditioning demonstration unit* to be used in the study of the *thermodynamics of moist-air* which is called *psychrometrics*. Psychrometric processes involve the heating/cooling and humidification/de-humidification of air. These processes are fundamental to the engineering of heating, ventilation, and air-conditioning *(HVAC)* equipment widely used in residential and industrial settings.

The proposed air conditioning unit consists of a rectangular flow duct with eight components: 1) a variable-speed blower, 2) heater, 3) humidifier, 4) observation port, 5) refrigeration section, 6) heater, 7) observation port, and 8) orifice plate with manometer; stated in the order from inlet to exit. Additional instrumentation is built into the system to measure pressure, wet-bulb and dry-bulb temperatures and refrigerant flow rates. With this combination of components, it is possible for students to investigate a large number of psychrometric operations in detail.

Proposal Benefits:

The proposed equipment will serve as a most valuable teaching tool in the following courses; each taught twice a year:

- ME 354 Thermodynamics 2 (3^{rd} year core course; enrollment: 60-80)
- ME 452 Energy Transfer in Buildings (4^{th} year HVAC course; enrollment: 40-50)

Clearly, a large number of students will benefit from the availability of this equipment.

Cost Breakdown:

As shown in the attached quotation, the cost of the equipment as a complete package including shipping is $12,986 US which is approximately $19,090 CND at an exchange factor of 1.47.

Implementation Schedule:

The equipment will be used in the courses indicated above as soon as it becomes available.

Additional Information:

It is worth noting that this laboratory equipment is *strictly* for undergraduate teaching.

22. Mechatronics Laboratory Equipment

Submitted by:

M. Kaptein,
rkap@surya.uwaterloo.ca
Extension: 3026
Lab Director, Mechanical Engineering

Description of Proposal:

The departments of Mechanical Engineering, Electrical & Computer Engineering, and Systems Design Engineering have proposed an option in Mechatronics. Mechatronics can be defined as an interaction of mechanical systems, electrical hardware and software applications. Students from the participating departments must take at least a one term Mechatronics Project Course in addition to specified courses in each of the participating departments.

The Mechatronics Design Project (course) requires a great deal of new equipment and the Departments will provide a significant amount of funding. There will however, be a need for additional assistance for the purchase of two digital oscilloscopes and a chip programmer.

Benefits of Proposal:

The Mechatronics Design Project (course) will provide a facility which will be used by three departments in response to a growing demand for interdisciplinary skills.

Cost Breakdown of Proposal:

2 digital oscilloscopes @ $4,500.		$ 9,000.00
Chipmaster Programmer		2,047.00
	Sub Total	$11,047.00
	G.S.T.	773.29
	P.S.T	883.76
	Total	$12,704.05
WEEF funding requested		6,350.00
Mechanical Engineering		6,354.05

Implementation Schedule for Project

Fall 98

23. Polaris Networking

Submitted by:

M. Kaptein
rkap@surya.uwaterloo.ca
Extension: 3026
Lab Director, Mechanical Engineering

Description of Proposal:

Engineering Computing plans to discontinue support for the Proteon Pronet-10 ring network card as of May, 1999. All Polaris computers in Mechanical Engineering are using the Pronet card and need to be converted to an Ethernet system before this date.

Benefits of Proposal:

High performance net access

Cost Breakdown of Proposal:

18 network computer cards		$ 1,080.00
4 network server cards		320.00
1 switch and repeater		4,450.00
Cable and labour		1,875.00
	Sub Total	$ 7,725.00
	G.S.T.	540.75
	P.S.T.	618.00
	Total	$ 8,883.75

Implementation Schedule for Project

Fall 98

24. Printed Circuit Board Manufacturing Facility

Submitted By:

Your Name: Loris Rossi
E-mail: l2rossi@engmail.uwaterloo.ca
Phone Number: Ex: 3836
Position: Staff- Systems Design Engineering Tech.

Description of Proposal:

A full P.C.B. manufacturing facility (software and hardware) for undergrad students to produce very good quality circuit boards for workshops and/or group projects.

Proposal Benefits:

This equipment will allow undergrad students to produce a professional printed circuit board for their design or to test and build a prototype of their circuit in order to test their design in field conditions that are impractical with a breadboard.

Eg Certain testing of high currents cannot be performed on breadboards due to the low current limits of the breadboard.

Undergrad students who work in-groups such as Midnight Sun and the Propane challenge car have both benefited in the past from using various equipment such as the PIC system, along with other electronic test equipment. Seeing that there is a need for this type of equipment and knowing that none of the departments in engineering even has a printed circuit board manufacturing system.

Cost Breakdown:

The items needed to produce a complete printed circuit board is:

1: A software package called Orcad Capture and Layout plus, to design a drawing and layout of the circuit to be placed on the printed circuit board. ($2000.00 with tax)

2: A Printed Circuit board etching system that consists of a etching tank with stand, a agitating pump and a thermostat heater. (Price $209.17with tax)

3: Etching trays for different P.C. board sizes (Price $31.48with tax)

4: U. V. Exposure light Box (Price $416.04with tax)

5: Consumable materials such as:

a) solder $3.66
b) drill bits $5.00each (recommend 2 of each and 5 various sizes)
c) liquid solder flux $6.27
d) tinning solution $13.44
e) etching solution $29.46
f) Fine tip knives $9.50
g) etch resist laquer $6.64
h) stripping solution $4.20
I) print kote conformal coating $11.36
J) etch resist pens $9.75
k) Printed circuit tool kit $33.22

Total: $2860.82

Implementation Schedule:

Once the main components are purchased the system could be set up immediately. It should only require up to a maximum of three weeks for delivery for the entire products listed

Additional Information:

The basic process of producing a printed circuit board would entail using a software package that would allow a engineering student/developer to design a P.C.B. layout on computer from a students schematic/breadboard design. The software program would allow a user to produce a completed circuit layout on a transparency. The next step will be to use a U.V. light box to burn the layout of the circuit from the transparency on to the U.V. sensitive P.C. board. These transparencies could be saved and used multiple times. The next step would be to place the P.C. board into the etchant solution in the holding tank. This solution will remove the copper that was not exposed to the U.V. light. Thus leaving the desired circuit on the P.C. board which is ready to be placed into the tinning solution tray this will tin the copper circuit that is remaining. The final stage of the process is to drill holes in the locations indicated on the P.C. board so it can be populated with components. Then the P.C. board is ready for performance testing and if working properly put into immediate use.

25. Mixed Signal Oscilloscope (HP 54645D MSO)

Submitted By:

Monica Milanowski
mmilanow@engmail.uwaterloo.ca
(519) 725-5305
Student (3A Systems Design)

Description of Proposal:

Purchase a mixed signal oscilloscope, namely the HP 54645D Mixed Signal Oscilloscope.

Proposal Benefits:

No other device is available that can correlate both digital and analog information at the same time. More and more, digital and analog technologies are found in systems, and such a device would enable students to be able to capture both sets of data at the same time and isolate cause and effect in complex circuits. An example of such a student initiative is a fourth year Systems Design project to develop a voice recognition system for wheelchairs. The human voice is an analog signal that would be converted to digital form and then the digitized voice commands may be processed. A mixed signal oscilloscope would be able to capture both data streams at the same time for analysis.

The University of Waterloo prides itself on being a "leading edge" university, and purchasing equipment, which relates to emerging technology will help the engineering department maintain that status

Cost Breakdown:

Price (with education discount of 20%)	$6041
Taxes	$906.15
Total	**$6947.15 + delivery charges**

Implementation Schedule:

Purchase equipment as soon as possible. It will be kept and maintained by the Systems Design lab.

Additional Information:

The following website lists the technical specifications of this device:
http://www.tmo.hp.com/tmo/pia/BasicInstrument/Level0/English/BI-MOAB.html

26. Ethernet Switches for Systems Design

Submitted By:

Your Name: Dave Walsh
E-mail: dwalsh@zeus.uwaterloo.ca
Phone Number: ext 2234
Position: Senior Lab Tech

Description of Proposal:

The ethernet backbone in Engineering is being upgraded and we are required to install the necessary switches to accommodate our own computer network. We require four 24 port high speed secure switches and are looking to WEEF for support.

Proposal Benefits:

The benefits are twofold. We are required to eliminate all the old PRONET cards and cable that are running our POLARIS network by May 1st 1999 and at the same time upgrade existing network connections to accommodate changes to the new university backbone. These changes will dramatically improve the "network" communication speed both within and outside of the university.

Cost Breakdown:

The switches are $4343.00 each (we qualify for an additional 30% educational discount which brings the price to $3040.10)

CISCO WS-C2924-XL 24-Port 10/100 Fast Ethernet Switch

4 units @ $3040.10 = $12,160.40
tax (10%) = $1216.04
TOTAL = $13,376.44

The Department of Systems Design is willing to fund half of the total cost of the implementation.

Implementation Schedule:

Because of the extent of re-cabling, we would have to take down our POLARIS network. So we would like to start implementing the changes in August when students have left.

Additional Information:

27. New Monitors for the Lever Lab

Submitted By:

Your Name: Martin MacLeod
E-mail: martin@engmail.uwaterloo.ca
Phone Number: 2965
Position: Manager of Hardware Operations and Systems Reliability
Engineering Computing

Description of Proposal:

The current monitors in the Lever lab are 15" Mitsubishis that were manufactured and purchased in 1993. The monitors have been very reliable over the past 5 years, but they are now all out of focus and some of them ghost and smear in VGA mode. They are currently the last batch of small monitors we have in use in Engineering Computing Labs; the remainder are 17".

To date, the monitors Engineering Computing has purchased have been 1280x1024 resolution, but quite a few companies now sell a 1600x1280 resolution version which provide a crisp image at a competitive price. A rough price comparison is as follows:

Resolution	Cost range
1280x1024	$448-$930
1600x1280	$580-$1084

A good mid range monitor is the ADI 17" Microscan 5G (0.26mm, 1600x1200) at $720.

Proposal Benefits:

The monitors will improve the working environment for all students who use the Lever lab. Eyestrain will be reduced and the quality and size of the image will be improved. The new monitors are expected to have a 5-6 year lifespan.

Cost Breakdown:

Quantity	Description	Cost	Taxes	Total
18	ADI 17" Microscan 5G	$720	11%	**$14,386**

Implementation Schedule:

An order will be placed when the proposal is approved for installation within a month September is the target date

Additional Information:

The old monitors can be reused as print server monitors and/or server monitors.

Partial funding is welcome.

28. High Performance File Server for Waterloo Polaris and Unix Systems

Submitted By:

Name: Bruce Campbell
E-mail: bruce@engmail uwaterloo.ca
Phone Number: 885-1211 ext. 5889
Position: Manager of the Waterloo Polaris PC network and System Security

Description of Proposal:

The proposal is to install a central high performance file server to provide

- file storage for Waterloo Polaris in Engineering and certain UNIX systems as desired
- increased functionality and flexibility for the user
- increased reliability and
- simplified fault recovery

using technology which is easily managed and scalable.

At present, each Waterloo Polaris server contains file storage for a certain subset of users, and that storage is allocated on a fixed basis (i.e. each user is typically assigned 10 megabytes, and they consume 10 megabytes of server disk regardless of their actual file sizes). Access to Waterloo Polaris files from UNIX or from home is limited to 3 concurrent users via FTP.

The nature of the Waterloo Polaris server, with it's fixed disk allocation, means that a significant amount of disk space is online, but unusable. This typically requires deleting all accounts at the end of each term, to make space for the returning students. A reasonable number of returning students who find last terms data gone, request file restores from the tape backup system. The tape backup system for Waterloo Polaris requires significant operator intervention for file restores, leading to delays.

Technology on the market has advanced to the point where a single high performance file server could provide:

- permanent file storage for all Waterloo Polaris users right from 1A to graduation.
- data longevity - Waterloo Polaris accounts may be deleted and re-added, but the users files would remain.
- convenient and available remote access - users could access their files from anywhere in the world, via FTP or SMB, at any time (even if their Waterloo Polaris account no longer exists)

- RAID disk storage to provide fault tolerance. Redundant hard disks mean that single disk crash causes no data loss. A replacement disk can be "hot swapped" and repopulated automatically. This eliminates downtime from crashed disks.
- Fully automated robotic tape backups and restores, to recover from catastrophic failure, or to get back that important document you created last year, but deleted months ago. Tape restores for onsite backup tapes are free, while offsite tapes (data older than 1 month) are $10.00. (This is using the "Hoover" tape backup service offered by IST. See *www.ist* and "backup" under "IST services" for more information.)
- data "snapshots" - Magic directories which are read/only contains yesterdays data, and last weeks data, meaning that users can get back a file from a day or a week ago without even having to go to tape. These "snapshots" are implemented by the file system, and consume no disk space for unchanged files. The system administrator configures the timing of the snapshots.
- scalable architecture - disk space can be added at a single point, to allow for increased needs, without the system manager having to visit 20 or 30 separate servers.
- Ability to have UNIX hosts share the same user file space with Waterloo Polaris, meaning that user files are available from all platforms, and disk requirements on each Unix host remain static. A user gets a combined disk quota, rather than several smaller quotas.
- increased disk quota for the user. The efficient and combined storage, while not wasting user quota for Win95 configuration files will give users more file space.

The specific product to be used as a central file server has not been chosen, but the most promising appears to be a "NetApp Filer" from Network Appliance Incorporated. (See www.netapp.com for more information). The Math Faculty Computing Facility is already using a NetApp for their Waterloo Polaris users, and all of their undergraduate Unix systems. When a Math student logs in to Waterloo Polaris, they still have their N:\ disk (which is on the Waterloo Polaris server), but they also get a P:\ disk on the NetApp. The N:\ disk contains the Windows95 configuration files, while the P:\ disk contains the users file. The P:\ file space is the same file space a Math user sees when they login to Unix. This can greatly simplify file maintenance for the user.

Proposal Benefits:

Summary of advantages (see previous section for more details):

- consolidated space for novice, engmail, web server, Waterloo Polaris
- increased disk quota for all Engineering students
- permanent storage space from 1A to graduation
- free tape restores of data within the last month "Snapshots" allow of easy restore of recently lost data.
- flexible off campus access
- high reliability

Cost Breakdown:

NetApp F230 with :

- 80 gigabytes disk space
- 192 megabytes RAM
- 8 megabytes non volatile RAM
- 4 100 megabit full duplex Ethernet cards

Total cost is : **$55,710US**

Our request to WEEF for the summer 1998 term is **$20,000** (partial funding welcomed).

Implementation Schedule:

Prior to May 1, 1999 as funding permits.

Additional Information:

Moving to a high performance file serving technology is one of Engineering Computings' major goals for 1998/1999. $30,000Can has been earmarked for this project out of Engineering Computing funds, and we will be pursing other sources of funding in support of this project in the coming months. We would like to be in a position to know whether a purchase this year will be feasible by December, 1998 for implementation by May 1999.

29. Full Size Plotter for Drawings

Submitted By:

Your Name: James Wallace
E-mail: jawallac@engmail
Phone Number: 571 9214
Position: undergrad student

Description of Proposal:

Computer plotter for printing drawings. Recommended. HP DesignJet 700. Black and white plotter capable of printing on 36 inch sheets. I would like to see it in one of the general computer labs or the civil computer lab.

Proposal Benefits:

Give access to students to print quality full size drawings. Right now routing to a plotter and finding the printout is not very easy.

Cost Breakdown:

24 inch sheet model $4500 American, $5900 Canadian (est.)
36 inch sheet model $6000 American, $8400 Canadian (est.)

Another $100 for paper and ink. (Paper comes on a huge roll, will last a long time)

Implementation Schedule:

As soon as the school can connect it to Polaris.

Additional Information:

I only looked at the Hewlett Packard web site for pricing. I have no idea if HP offers special pricing for academic purposes or not.

30. Equipment Student Shop

Submitted By:

C. Wallace,
rkap@surya.uwaterloo.ca
Extension: 2301
Supervisor, Engineering Student Shop

Description of Proposal:

The Student Machine Shop provides essential hands-on experience for all undergraduate students either for core class courses or special projects. The shop is in need of a variable speed drill press and tapping machine. The drill press and tapping machine now being used in the Student Machine Shop is continually breaking down and in constant need of maintenance, it is questionable how much longer it will be useable.

Proposal Benefits:

Students from all engineering disciplines will benefit from a better equipped student shop. More courses are requiring hands-on projects, making it essential to have better equipment available.

Cost Breakdown:

Ellis 9000 Drill Press and Tapping Machine	$4,400.00
GST 7%	308.00
PST 8%	352.00
Total	*$5,060.00*

Implementation Schedule:

Summer/98

31. University Of Waterloo Alternative Fuels Team

Submitted By:

Your Name: Nicole Dufour
E-mail: nedufour@engmail.uwaterloo.ca
Phone Number: ext. 6208
Position: Team Leader, University of Waterloo Alternative Fuels Team

Description of Proposal:

- FLUKE 92B Scopemeter with Glitch Detection
- Funds for tools and miscellaneous supplies

Proposal Benefits:

Scopemeter - This is a handheld Oscilliscope and Digital Multimeter in one package. The small size of this scope will make measuring hard to reach electrical engine signals possible. It will become an indespensible tool during the development and trobleshooting of an engine control module. Measurements taken by the Scopemeter can also be downloaded to a PC for further investigations or for use in reports or presentations. This tool is not vehicle specific and can be used for other UW projects such as Formula SAE or Midnight Sun.

Miscellaneous Funds - A number of items are required such as axle stands, some basic tools and electrical components. All of these items are required by the team to complete their project and will be utilized by future teams for many years to come.

Cost Breakdown:

Scopemeter - $1595 (US)

Miscellaneous Funds - $350

Implementation Schedule:

Scopemeter: The Scopemeter will be put to immediate use by the Controls Group of the Alternative Fuels Team upon procurement. Other project teams shall borrow the tool as required.

Miscellaneous Funds: The funds will be allocated this term to the items deemed to be the most necessary.

Additional Information:

Scopemeter - Attempts have been made to contact Fluke Canada but as of yet no response has been received. The price we have quoted is from Metermaster in the U.S. but we will continue to try and contact the Mississauga office.

Miscellaneous Funds - UWAFT is proposing that WEEF assist us in funding the purchase of these miscellaneous items. We will also be allocating several hundred dollars of our corporate sponsorship money to this effort.

32. Kamikaze Ice Dragons – Concrete Toboggan '99

Submitted By:

Your Name: André Brisson
E-mail: albrisso@engmail.uwaterloo.ca
Phone Number: 725-2637
Position: Team Coordinator

Description of Proposal:

The 1999 Concrete Toboggan Team is asking WEEF to support the concrete toboggan entry in the 1999 Great Northern Concrete Toboggan Races. We are requesting financial support for a total of $3750 This value will cover the uniform and team member entrance fee for the 1999 Great Northern Concrete Toboggan Races in Waterloo.

Proposal Benefits:

This contribution will benefit approximately 25 Civil Engineering students involved with the project from the 4A class, XploCIV. The team members will have the opportunity to gain hands on experience in areas such as finance, marketing, project management, design, build and team work. The University of Waterloo's attendance at the races will uphold the reputation of Waterloo Engineering excellence and promote the school internationally.

WEEF involvement will be proudly displayed on all promotional material including sponsorship brochures, team uniforms, and the technical display. WEEF sponsorship of the 1999 Concrete Toboggan Team will be recognizable to other corporate sponsors, schools across Canada and the United States, the general public of Waterloo. With the fantastic past contributions of WEEF, the WEEF logo will be the largest logo on all promotional items.

Cost Breakdown:

Team uniforms:		$1,625
Entrance Fees:	25 x $85	$2,125
TOTAL:		$3,750

Implementation Schedule:

Fundraising began February 27, 1997.
Design and Building of the toboggan will begin May, 1998.
Races will be held February, 1999 in Waterloo

Additional Information:

Please note that the Concrete Toboggan entry sponsorship is affected with the fact that the races are held in Waterloo.

33. Great Northern Concrete Toboggan Races- Hosting Committee

Submitted By: Carrie Junker and Mark Popik

Your Name: Mark Popik
E-mail mpopik@engmail
Phone Number: (519) 725 - 2637
Position: Co–Chair

Description of Proposal:

The Great Northern Concrete Toboggan Races (GNCTR) is a civil engineering competition where over 500 university students from across Canada and around the world meet to display their engineering creativity and innovation. Each team consists of a minimum of six students who are required to design, construct, and race a toboggan with a running surface made completely out of Portland based concrete. The objective of this type of engineering competition is to encourage engineering students to generate creative solutions to existing problems.

The GNCTR'99 will be held on February 3–7, here in Waterloo. Several Engineering students have been hard at work preparing for this event, but as in any competition raising the necessary funds is a difficult job. It is for this reason that we are asking WEEF to be a supporter of our competition. This term is the only opportunity for B society to support this event, we asking WEEF to donate $8,000 to help meet our fundraising goal.

Proposal Benefits:

By supporting this competition, WEEF will be place as a GOLD LEVEL sponsor. The benefits WEEF will receive are:

- Logo on the GNCTR letterhead, used on all correspondence, including other potential sponsors, Universities and students.
- Full page advertisement in the preliminary booklet given to all competitors
- Internet link from the GNCTR homepage.
- Large font of logo on our list of sponsor banner displayed at all events.
- A banner at the Mini Olympic event which includes your logo. This event is held on campus.

Cost Breakdown:

Preliminary Budget		
Wednesday		
Buses to P/u at the airport		$2,500.00
Regestration Package		$3,000.00
Dinner		$7,000.00
	Total	**$10,000.00**
Thursday - Olympic		
Transportation for the day		$5,500.00
Federation Hall and		$10,000.00
Meals		$14,000.00
Olympic supplies - incl.		$7,000.00
	Total	**$36,500.00**
Friday - Technical		
Transportation for the day		$7,000.00
Meals, Entertainment		$13,500.00
Equiptment rentals		$3,000.00
	Total	**$23,500.00**
Saturday - Race Day		
River Valley Hill		$5,000.00
Transportation for the day		$10,000.00
Meals		$7,000.00
Equiptment rentals, banners		$6,000.00
Insurance (policy, waivers,		$2,000.00
	Total	**$30,000.00**
Saturday - Awards		
Awards Dinner		$12,000.00
Decorations, program, band		$2,000.00
Trophies and Prize Money		$6,000.00
	Total	**$20,000.00**
Sunday		
Brunch		$5,000.00
transport to airport		$2,500.00
	Total	**$7,500.00**
Misc. costs		
Start-up to 2000 hosts		$2,000.00
Printing of posters, business		$3,000.00
Web site, computers, cell		$3,000.00
Judges rooms, thank-yous		$2,000.00
Sled Storage		$500.00
Organizers hotel rooms,		$2,500.00
Volunteer shirts, thank-you		$4,000.00
Postage, phone calls misc.		$1,000.00
Newsletter, Advertisments,		$1,500.00

25th ann. gifts	$3,000.00
Total	$22,500.00
TOTAL COSTS	$150,000.00

Implementation Schedule:

Preliminary Schedule of Events

	Feb. 3	Feb. 4	Feb. 5	Feb. 6	Feb. 7	
	Wednesday	Thursday	Friday	Saturday	Sunday	
6:00						6:00
7:00		Breakfast	Breakfast	Breakfast		7:00
8:00						8:00
9:00				Race Day at River Valley Country Club		9:00
10:00		Olympics at the University	Technical Exhibition At the *University* of Waterloo In the Student Life Centre		Brunch at Hotel	10:00
11:00						11:00
12:00	Arrivals at the 4 Points Hotel				Farewell	12:00
13:00						13:00
14:00						14:00
15:00						15:00
16:00						16:00
17:00	Dinner at the hotel	Dinner at Fed Hall		Awards Banquet & Dance		17:00
18:00						18:00
19:00	Hospitality Night	Entertainment at Fed Hall	Evening Entertainment			19:00
20:00						20:00

Additional Information:

This proposal is not related to the GNCTR team proposal. These two committees are organized separately.

34. 1999 Formula SAE

Infrastructure Development

Submitted By:

Your Name: Bryan Hemphill
E-mail: brhemphi@mechanical
Phone Number: ext. 5904
Position: '99 FSAE Team Leader

Description of Proposal:

The focus of the '99 teams WEEF donations will be on developing the teams infrastructure. Instead of acquiring exactly what is needed to complete an operational car, we would like to begin a development program on the car. This sort of program is one in which lower year students get more involved in the research and development of the race car. Although the '99 team may not reap the benefits of such a program since it is still in its infancy, the advantages should begin to be felt for the 2000 car. The difficulty in attaining this level of development is the cost of implementing the basis upon which the research relies. Initially this means the purchase equipment necessary to perform testing on both the '97 and '98 FSAE vehicles. Since we are already the top Canadian school and in the top ten in the world, building a great car is no longer good enough if we are to continue to advance in the standings. Innovation and development are the key to the number one position! With the help of WEEF the '99 team would like to continue to rise in placement at the competition and to help the years to follow to do the same.

Proposal Benefits:

The '99 plans for WEEF donations are not only beneficial to this years team but will become increasingly more advantageous as the years pass. This dissemination of information between years will lead to a progressively stronger Waterloo team. Continuation of this sort is necessary for first place contention.

Cost Breakdown:

ITEM	COST	COST (CDN)	QUOTE LOCATION	INFORMATION
Tent For Display Of Car	CDN$500	$ 500.00	Multiple Local Tent Suppliers	Many of our sponsorship events in summer outdoors & event use
Racing gloves/shoes	US$120	$ 174.00	Pegasus Racing	2 pair racing gloves - 1 pair racing shoes - Last purchase 4years
Wheels	US$800	$ 1,160.00	Monocoque Racing Wheels	Going to 13" Wheels from 10" wheels. Good for Many years.
Air Tools	CDN$500	$ 500.00	Canadian Tire	Development of the FSAE tool crib
Engine	CDN$2000	$ 1,500.00	Salvage Yards	Engine testing and development - Engine life approx 7 years.
Library	CDN$300	$ 300.00	SAE Book Store	Specialty racing liturature not available at library - indefinite life
Dampers - Testing	CDN$400	$ 400.00	Outdoor Equipment Ltd.	Noleen Dampers and springs for benchmark and dyno testing
Camera	CDN$200	$ 200.00	Bent's Cameras (Waterloo)	Required for technical documentation and sponsorship packages.
Zip Disk	CDN$220	$ 220.00	Future Shop	Back up storage and large CAD file transportation
Steering Wheel	US$148	$ 214.60	Pegasus Racing	High quality wheel has long lifetime potential
Engine controller	CDN$1200	$ 1,200.00	Electromotive	Required reqardless of funding on this engine - same lifetime as engine
	REQUEST TOTAL ========>	$ 6,368.60		

Implementation Schedule:

Implementation immediate upon approval of funding from WEEF.

Additional Information:

To reiterate, all WEEF donations go towards items which are for the long term development of the Formula SAE team and will not exclusively benefit the '99 team!

35. University of Waterloo Aerial Robotics Group

Submitted By:

Name: Dave Kroetsch
E-mail: admin@warg.uwaterloo.ca
Phone Number: xt. 5109
Position: Team Leader

Description of Proposal:

We are working on The Arrow-II, which will be the University of Waterloo's official entry for the Millennial International Aerial Robotics Competition held by the Association for Unmanned Vehicle Systems. It will be entered in the first qualifier during the summer of 1998, the second during 1999 and the competition itself held in the summer of 2000.

The UW Aerial Robotics Group was formed fall '97 by 5 Computer Engineering students and already has grown to consist of 12 members from various Engineering disciplines, both undergraduate and graduate. As we are a relatively new group, we are applying for funding to finance the setup of basic facilities and to allow us to purchase the hardware necessary to build our designs. We are requesting funding for a computer, camera system, and a high-drain power system. These are detailed below.

Proposal Benefits:

Our team will be one of the only Canadian teams entering and this will no doubt help our reputation among the international engineering community. This project will also help fulfill the need for an increased design component in the Electrical and Computer Engineering curriculum. This group will continue for many years and our work will help promote the reputation of the Faculty of Engineering here at the University of Waterloo. We believe that this is an exceptional opportunity for students to get involved in extracurricular activities and to apply their skills from both work and school to an exciting project.

Cost Breakdown: (in Cdn dollars, excluding all taxes and shipping costs)

In order to finance this project, we are requesting WEEF funding for the following items:

1. Pentium Computer	$2500.00
2. Pen-size camera system (with capture board)	$2100.00
3. Wide scale camera system	$1200.00
4. High-drain power system	$900.00
Total	$6,700.00

The total amount requested is $6,700.00. In the case that full funding is not possible for this project, the following partial funding cost

estimates are provided below (in order or preference):

Items 1, 2	$4600.00
Items 1, 3	$3700.00
Items 2, 3	$3300.00

Implementation Schedule:

The competition is being held this summer (August 14th 1998), so it is necessary that we receive funding as soon as possible in order for our work to get underway. All of the items listed above are necessary to make this project possible.

Additional Information:

The total cost of this project will exceed $100,000.00. As such, we are also seeking support from various companies in the form of donation of specialized hardware and/or software. We currently have (on loan) a DGPS system, worth $50,000.00, and radio modems worth $6000.00.

To decrease the processing time if your proposal is approved, please fill out the following:
If you are a student project, the cheque should be made out to:
University of Waterloo Aerial Robotics Group

If you are a department representative, please indicate whom WEEF should contact for obtaining a completed purchase requisition form.

36. IEEE Student Branch B

Submitted By:

Your Name: Karim S. Karim, Ben Lam, Michael G. Fowler
E-mail: kkarim@novice, blam@calum, mgfowler@sentex.net
Phone Number: (519)888-4567 ext. 6955
Position: IEEE Student Branch B Executive (Co-Chairs and Treasurer)

Description of Proposal:

The IEEE Student Branch operates the McNaughton Center of the University of Waterloo (E2 3359) as a service to IEEE student members as well as other students of the university, working closely with the E&CE department. The McNaughton Centre is in need of renovation and upgrading of various lab/computer equipment. A contribution from WEEF would go a long way to improving the condition of this room for the benefit of all E&CE students.

Proposal Benefits:

The McNaughton Center is the main office of the IEEE Student Branch and is in need of enhancement of the student library. The library is for the use of the IEEE student members, but is not restricted to use by E&CE students who are not members. The library can act as a reference center for students where they can find relevant and interesting E&CE texts and publications. As well, to allow better access to the room, and combination lock needs to be attached to the room door. Currently, the door is opened by a key, and therefore, only can be accessed by those who have a key.

The IEEE Student branch organizes and hosts events such as the Grad Studies Nights (where E&CE students get to meet the profs and learn about Graduate studies at Waterloo), Speaker presentations (involving technical speakers from industry), Student Paper Night (hosting a student paper competition for local univesities), micromouse competition, robotics competition as well as other student projects where the use of the McNaughton Center is required. Students will be able to come in and do all this at any time once the new door are installed. The IEEE McNaughton Center also provides a link for students to the Kitchener/Waterloo IEEE Section.

Cost Breakdown:

The following summarizes the equipment that needs to be upgraded/purchased along with the estimated costs. WEEF will, of course, be formally recognized in the form of a plaque/stickers that will be placed in appropriate locations.

keyless entry system	$500
IEEE Library (IEEE texts/ industry magazine subscriptions)	$1000
Bookshelves for Library	$500
Total	$2000

Implementation Schedule:

Since we are the IEEE Student Branch B, depending on when the funding arrives, the proposal will start to be implemented in Winter 1999 and should be completely implemented by the end of our 4B term.

37. Midnight Sun V Solar Car Project

Submitted By:

Your Name: Ruth Allen
E-mail: rg3allen@engmail
Phone Number: 888-4567 x2978
Position: Business Manager

Description of Proposal:

The Midnight Sun V team is currently preparing for Sunrayce 99. The existing car is in the process of being redesigned. Several factors are propelling the design:

- By analyzing our performance in the last race, we have determined several areas for improvement.
- Since the race route for Sunrayce 99 is completely different from that of Sunrayce 97, several major modifications must be made to the present solar car, notably the battery technology.
- A number of changes to race rules by the Sunrayce Officials are another reason for major design changes.

The Sunrayce 99 route down the eastern coast of the United States will challenge the adaptability of the car's various systems to their limit. This route is far more challenging than any Sunrayce routes to date - taking us over the Appalachian mountain range! A reliable battery pack will be of vital importance.

We propose to replace the current Lead Acid battery back with a NiMH battery pack and system. This change is necessary in order for our team to remain competitive. Batteries are essential for coping with changes in the weather and ensuring efficient energy management along the race. The two main advantages of NiMH batteries are their weight and capacity. The NIMH pack we are considering weighs half that of the previous pack and offers a 200% increase in capacity compared to Lead Acid batteries.

Another product used to optimize power consumption on the car are Maximum Power Point Trackers (MPPTs). The AERL MPPT is a power transformer that is used to optimize solar array performance under adverse conditions. These devices typically add 20-30% to the solar array output. They work by sensing the performance of the array connected to it and adjust the array voltage to find the optimum point to the cell's I-V curve. This results in maximum power availability.

Once again, our mechanical department is crying out for more duct tape. This product is probably the most important piece of equipment we use ☺

These modifications, however necessary, can not be undertaken given our present budget. It is our desire to increase fundraising efforts here on campus and in the Kitchener/Waterloo area through the sale of promotional items, but we do not expect to raise the required funds without the help of sponsors like WEEF.

Proposal Benefits:

Over the next 11 months, the Midnight Sun V Team will be devoted to developing a competitive car to race in Sunrayce 99. Students from many faculties are involved in designing and building subsystems for the car. Specifically, this term's team consists of approximately 80 engineering students from all disciplines and approximately 10 non-engineering students from geography, English, and science. Our seventh place overall finish as well as our Award for Mechanical Achievement in Sunrayce 97 encourage us to push the talent of Waterloo Engineering students to its maximum. Many students will also be dealing with industry for obtaining sponsorship and consulting.

Goals of Midnight Sun V:

- To redesign, build, and race a winning solar car for Sunrayce 99 in June of 1999.
- To develop an interdisciplinary engineering project that promotes education through applied engineering experiences.
- To represent Waterloo Engineering through exposure of the project at races, trade shows, and media events

Students who are working on this project must develop manufacturing techniques and quality assurance systems in order to produce a winning design. Students also benefit through working with our industry contacts as well as with other groups within the project.

Cost Breakdown: (in CND $, including all taxes and shipping costs)

Plan A:

2 Maximum Peek Power Point Trackers	$1,000	**Total:** $5,405.09
3 Ovonics battery ($1500/each)	$4,500	
2 rolls of Duct Tape	$ 5.09	

Plan B

2 Maximum Peek Power Point Tracker	$1,000	**Total:** $4,005.09
2 Ovonics battery ($1500/each)	$3,000	
2 rolls of Duct Tape	$5.09	

Plan C

2 Maximum Peek Power Point Trackers	$1,000	**Total:** $2,505.09
1 Ovonics battery $1,500		
2 rolls of Duct Tape	$ 5.09	

Implementation Schedule:

As soon as funding for these items becomes available, they will be purchased immediately.

Additional Information:

Sunrayce 99 promises to be an exciting race for the University of Waterloo. The Midnight Sun Team has made a name for itself due to its excellent performance in previous Sunrayces, especially Sunrayce 97. We will carry the name and reputation of our school far down the eastern cost of the United States under extensive media. Given the caliber of students on the team, we can only expect to improve our overall race ranking. We are proud to represent the University of Waterloo Engineering Faculty, the University of Waterloo, and Canada in this endeavor.