| WEEF Proposals & Allocations | Fall 1999 | |
|---|---|---|
| **Environmental** | Requested | Allocated |
| Environmental Competition | $ 3,000.00 | $ 3,000.00 |
| | | **$ 3,000.00** |
| **Civil** | | |
| Civil Eng Computer Lab Zip Drives | $ 2,600.00 | $ - |
| Brookfield Viscometer | $ 10,000.00 | $ 6,700.00 |
| | | **$ 6,700.00** |
| **Electrical** | | |
| E&CE '30 Series' Semiconductor Parameter Analyzer | $ 30,800.00 | $ - |
| E&CE Public Compter Room Upgrade | $ 11,250.00 | $ 7,500.00 |
| | | **$ 7,500.00** |
| **Mechanical** | | |
| Data Acquisition System for Instrumentation Demonstration and Thermal/Fluids Design Projects | $ 5,500.00 | $ 2,750.00 |
| Fluid Dynamics Media Presentation | $ 1,446.00 | $ - |
| Upgrade Printer in Rolling Lab | $ 680.79 | $ - |
| Upgrade Computers in CAD Design Studio | $ 6,315.00 | $ - |
| Upgrade Mechanical Electronic Classroom | $ 8,232.00 | $ 4,116.00 |
| Rolling Mill Control System | $ 4,232.00 | $ - |
| Videotape Series - Non-destructive Testing | $ 3,530.00 | $ - |
| Teaching Tools | $ 7,500.00 | $ - |
| Fuel Cell Demonstration Project | $ 14,653.00 | $ 3,746.00 |
| | | **$ 10,612.00** |
| **Systems Design** | | |
| Systems Design Engineering Ultra 10 Project Server | $ 7,505.82 | $ 7,505.82 |
| | | **$ 7,505.82** |
| **Misc** | | |
| Drill Press | $ 5,416.01 | $ 5,416.01 |
| Applied Science & Technology Index | $ 7,673.00 | $ - |
| Memory Upgrades for Engineering Computing Labs | $ 6,476.00 | $ - |
| Faculty Email Server Appliance | $ 5,000.00 | $ 5,000.00 |
| | | **$ 10,416.01** |
| **Sub-Total Department** | **$ 141,809.62** | **$ 45,733.83** |
| **Student Groups** | | |
| Mini-Baja Design Team | $ 176.00 | $ 176.00 |
| Formula SAE Team 2000 | $ 5,298.00 | $ 5,298.00 |
| Midnight Sun | $ 5,700.00 | $ 4,200.00 |
| 2001 Concrete Toboggan Teams | $ 2,096.00 | $ 1,296.00 |
| GNCTR 2000 Team, Stone Cold | $ 2,984.00 | $ 2,238.00 |
| CSC2000 Clean Snowmobile Challenge | $ 9,251.50 | $ 6,751.50 |
| **Sub-total Student Groups** | **$ 25,505.50** | **$ 19,959.50** |
| **Total** | **$ 167,315.12** | **$ 65,693.33** |

# WEEF PROPOSALS - FALL 1999

| | Applicant | Title of Proposal | Amount Requested |
|---|---|---|---|
| | **Miscellaneous** | | |
| 1 | Enginering Student Shop | Drill Press | $5,416.01 |
| 2 | Mary Stanley | Applied Science & Technology Index | $7,673.00 |
| 3 | Department of Engineering Computing | Memory Upgrades for Engineering Computing Labs | $6,476.00 |
| 4 | Department of Engineering Computing | Faculty Email Server Appliance | $5,000.00 |
| | **Teams** | | |
| 5 | Mini-Baja Design Team | Miscellaneous | $176.00 |
| 6 | Formula SAE Team 2000 | Miscellaneous | $5,298.00 |
| 7 | Midnight Sun | Miscellaneous | $5,700.00 4200 |
| 8 | 2001 Concrete Toboggan Teams | Miscellaneous | $2,096.00 1296 |
| 9 | GNCTR 2000 Team, Stone Cold | Miscellaneous | $2,984.00 2238 |
| 10 | CSC2000 Clean Snowmobile Challenge | Miscellaneous | $9,251.50 6751.50 |
| | **Mechanical** | | |
| 13 | M. Kaptein | Data Acquisition System for Instrumentation Demonstration and Thermal/Fluids Design Projects | $5,500.00 2750 |
| 14 | M. Kaptein | Fluid Dynamics Media Presentation | $1,446.00 |
| 15 | M. Kaptein | Upgrade Printer in Rolling Lab | $680.79 |
| 16 | M. Kaptein | Upgrade Computers in CAD Design Studio | $6,315.00 |
| 17 | M. Kaptein | Upgrade Mechanical Electronic Classroom | $8,232.00 4116 |
| 19 | Prof. J.G. Lenard | Rolling Mill Control System | $4,232.00 |
| 20 | Prof. N. Zhou | Videotape Series – Non-destructive Testing | $3,530.00 |
| 21 | Prof. R. J. Pick | Teaching Tools | $7,500.00 |
| 22 | Professor Xianguo Li | Fuel Cell Demonstration Project | $14,653.00 3746 |
| | **Electrical** | | |
| 11 | Paul Hayes | E&CE '30 Series Semiconductor Parameter Analyzer | $30,800.00 |
| 12 | Eric Praetzel | E&CE Public Computer Room Upgrade | $11,250.00 7500 |
| | **Systems Design** | | |
| 23 | Kevin Krauel | Systems Design Engineering Ultra 10 Project Server | $7,505.82 |
| | **Civil** | | |
| 24 | Gordon Turner | Civil Eng Computer Lab Zip Drives | $2,600.00 |
| 25 | Professor Susan Tighe | Brookfield Viscometer | $10,000.00 6700 |
| | **Environmental** | | |
| 18 | Tabitha Lee | Environmental Competition | $3,000.00 |
| | **TOTAL** | | $167,315.12 |

total $65693.3

# WEEF PROPOSALS - FALL 1999

| | Applicant | Title of Proposal | Amount Required |
|---|---|---|---|
| | **Miscellaneous** | | |
| 1 | Enginering Student Shop | Drill Press | $5,416.01 |
| ~~2~~ | ~~Mary Stanley~~ | ~~Applied Science & Technology Index~~ | ~~$7,673.00~~ |
| 3 | Department of Engineering Computing | Memory Upgrades for Engineering Computing Labs | $6,476.00 |
| 4 | Department of Engineering Computing | Faculty Email Server Appliance | $5,000.00 |
| | **Teams** | | |
| 5 | Mini-Baja Design Team | Miscellaneous | $176.00 |
| 6 | Formula SAE Team 2000 | Miscellaneous | $5,298.00 |
| 7 | Midnight Sun | Miscellaneous | $5,700.00 |
| 8 | 2001 Concrete Toboggan Teams | Miscellaneous | $2,096.00 |
| 9 | GNCTR 2000 Team, Stone Cold | Miscellaneous | $2,984.00 |
| 10 | CSC2000 Clean Snowmobile Challenge | Miscellaneous | $9,251.50 |
| | **Mechanical** | | |
| 13 | M. Kaptein | Data Acquisition System for Instrumentation Demonstration and Thermal/Fluids Design Projects | $5,500.00 |
| 14 | M. Kaptein | Fluid Dynamics Media Presentation | $1,446.00 |
| 15 | M. Kaptein | Upgrade Printer in Rolling Lab | $680.79 |
| 16 | M. Kaptein | Upgrade Computers in CAD Design Studio | $6,315.00 |
| 17 | M. Kaptein | Upgrade Mechanical Electronic Classroom | $8,232.00 |
| ~~19~~ | ~~Prof. J.C. Lenard~~ | ~~Rolling Mill Control System~~ | ~~$4,232.00~~ |
| 20 | Prof. N. Zhou | Videotape Series – Non-destructive Testing | $3,530.00 |
| 21 | Prof. R. J. Pick | Teaching Tools | $7,500.00 |
| 22 | Professor Xianguo Li | Fuel Cell Demonstration Project | $14,653.00 |
| | **Electrical** | | |
| 11 | Paul Hayes | E&CE '30 Series Semiconductor Parameter Analyzer | $30,800.00 |
| 12 | Eric Praetzel | E&CE Public Computer Room Upgrade | $11,250.00 |
| | **Systems Design** | | |
| 23 | Kevin Krauel | Systems Design Engineering Ultra 10 Project Server | $7,505.82 |
| | **Civil** | | |
| 24 | Gordon Turner | Civil Eng Computer Lab Zip Drives | $2,600.00 |
| 25 | Professor Susan Tighe | Brookfield Viscometer | $10,000.00 |
| | **Environmental** | | |
| 18 | Tabitha Lee | Environmental Competition | $3,000.00 |
| | **TOTAL** | | $167,315.12 |

## *MISCELLANEOUS*

### *Proposal #1*

**Proposal Title:** **EQUIPMENT STUDENT SHOP**

**Submitted by:** Clarence Wallace, Supervisor, Engineering Student Shop
Extension: 2301

**E-Mail:** rkap@surya uwaterloo.ca

**Description of Proposal:**

The Student Machine Shop provides essential hands-on experience for all undergraduate students either for core class courses or special projects. We need like to add two drill presses to meet current student needs.

**Benefits of Proposal:**

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 and safer equipment available. The number of students using the shop has increased quite dramatically over the past two years and this underlines the need to continually upgrade wherever possible.

**Cost Breakdown:**

| | |
|---|---|
| 2 – A51816 Wilton 15" Vari-Speed Drill Presses @ $2,359.14 (For each.) | $ 4,718.28 |
| GST | 320.27 |
| PST | 377.46 |
| **Total** | **$ 5,416.01** |

**Implementation Schedule:**
Immediately upon funding

## *Proposal #2*

**Title:** **Applied Science & Technology Index**

**Submitted By:**
Name: Jim Parrott and Mary Stanley
E-mail: jrparrot@library ; mstanley@library
Phone Number: ext. 3109; ext. 6019
Position: Jim Parrot, Librarian; Mary Stanley, Development Officer

**Description of Proposal:**
The Library would like to apply for funding to purchase the database *Applied Science & Technology Index/Abstracts*. This is an internet-accessible index of journal and magazine articles covering more than 480 core scientific and technical publications. Topics include engineering, acoustics,chemistry, computers, metallurgy, physics, plastics, telecommunications, transportation, and waste management.

**Proposal Benefits:**
This database corresponds to a print publication with the same name, which is the best source of journal and magazine articles for undergraduate engineering students. The Library owns a large percentage of the journals and magazines indexed (70% or 336 journals out of the 480.) The internet-accessible version would be more convenient for students to use since they could access the database from their home computer, lab or the Library.

**Cost Breakdown:**
We estimate that the use of this database would be high so our preference would be to subscribe to a site licence that would provide for an unlimited number of simultaneous UW users.

Site Licence: $7,673 CDN ($5,160 US)

If complete funding were not available, another option would be to subscribe to the database with limited access.

5-8 simultaneous users: $4,476 CDN ($3, 010 US)

**Implementation Schedule:**

Once a funding decision has been made, the database could be available for student use within a week.

**Additional Information:**
More information about the database is available at:
http://www.hwwilson.com/Databases/applieds.html

## *Proposal #3*

**Title:** ***Memory Upgrades for Engineering Computing Labs***

**Submitted by:**
Name: Martin MacLeod
e-mail: martin@engmail.uwaterloo.ca
Phone: ext. 2965
Position: Manager of Hardware Operations and System Reliability
Department of Engineering Computing

**Description of Proposal:**

Engineering Computing is an academic-support department within the Faculty of Engineering which provides leadership in the development and support of the Waterloo Polaris environment and the faculty computing communications network. It also manages and supports general purpose computing labs for academic use within the faculty and a number of servers that provide faculty-wide web and e-mail services to undergraduate students.

The focus of this proposal is to upgrade memory on the PCs in Engineering Computing managed labs: GAFF, Helix, Wedge, Lever and Wheel, a total of 114 machines.

Currently, the PCs in these rooms are Pentium-class PCs with processors of speeds ranging from 100MHz to 166MHz and 32MB of RAM. Most of the machines were purchased in early 1997 and are now 2 1/2 years old. They have been running Windows 95 since Fall 1997. The faculty plans to run Windows 95 until Windows 2000 is released and stable, probably 1 1/2 years from now. At that time, we expect to carry out major equipment upgrades which will be staged over approximately one year. CPU and motherboard upgrades between now and then are possible, but without large changes in the software we are running, may be excessively expensive for the faculty.

To increase speed and reliability, and to get additional life out of our current equipment investment, this proposal requests WEEFs assistance in upgrading the memory in Gaff, Helix, Shim, Wedge, Lever and Wheel to 64MB RAM from 32 MB. Additional memory has been shown to reduce the frequency of system crashes and to improve speed without major investments in new CPUs and motherboards. This may prove particularly valuable in light of the fact we have recently upgraded AutoCAD from version 12 to version 14 (which requires a minimum of 32 MB RAM).

**Proposal Benefits:**

The benefits of this proposal accrue to all users of Engineering Computing labs:

- increased speed
- improved performance
- lengthening the life of our current equipment.

**Cost Breakdown:**

The request to WEEF is for 1/2 the cost of the upgrade. Engineering Computing will match this amount.

| Description | Quantity | Price/unit | Total | Total with 10.3% Taxes |
|---|---|---|---|---|
| Upgrade to 64MB RAM (32 Meg EDO Simm | 114 | $103 | $11,742 | $12,951 |
| Contribution from Engineering Computing: | | | | $6,476 |
| Request for funding from WEEF | | | | ***$6,476*** |

**Implementation Schedule:**

Once approved, the RAM can be purchased and installed within a month, preferably before the end of the fall term.

-> ram in Weef Lab?

-> Price of ram ~~fluctuates~~, is that price reasonable.

-> Ram used with new motherboards?

No!!!

## *Proposal #4*

**Title:** ***Faculty Email Server Appliance***

**Submitted by:**
Name: Erick Engelke
e-mail: erick@engmail.uwaterloo.ca
Phone: ext. 5893
Position: Manager of Networks and Systems Integration,
Department of Engineering Computing

**Description of Proposal:**
Engineering Computing is an academic-support department within the Faculty of Engineering that provides leadership in the development and support of the Waterloo Polaris environment and the faculty computing communications network. It also manages and supports general purpose computing labs for academic use within the faculty and a number of servers that provide faculty-wide web and e-mail services to undergraduate students.

The focus of this proposal is to provide a high-quality reliable and scalable replacement for engmail.

**Background:**
Currently, the faculty server 'engmail' provides sendmail and IMAP and POP servers to process and serve e-mail for engineering undergraduates, many staff and faculty. It processes 16,000 to 17,000 messages per day and responds to an average of 40,000 requests to check mail per day. Demand for email services has been growing in several dimensions:

- the number and size of email messages
- an increased use of attachments
- an increase in the number of users who log in to engmail directly from home, co-op workterms and the residences. This will increase further as the number of Bell high speed access from home and Rogers cable users increase.
- an increase in use of the more demanding IMAP protocol (users log into the server, process mail and typically leave email on the server; the older POP protocol is used to download email from the server in a quick burst).

Engmail started its life in August 1997 as a single processor Pentium running FreeBSD. It has had memory upgrades to 192MB Ram later in 1997, and has OS upgrades in December 1997, June 1998 and May 1999. Due to increased demands, it was upgraded to dual 350MHz Pentium II processor machine with 392MB RAM, 8GB user disk space and 2GB system disk space in May 1999.

The current email hardware and software platform and its expansion path to be limited in its scalability and reliability. Frequent hardware upgrades have been necessary to keep up to demand, but this is proving to be a catch-up game with the current platform and requires constant monitoring and system administration. Average load levels on engmail increase over the morning hours from 3-4 and peak at about 5 in the mid-afternoon. Response times during the afternoon peak periods can be quite slow. Engmail refuses additional connections approximately 5% of the time in the 9am to 5pm period (when the load level reaches 12 or more).

We feel it is necessary to move to a more substantial, scalable system that is more easily supported for this crucial part of our computing environment. This is the focus of the proposal to WEEF.

**The Proposal:**

To purchase a Mirapoint M1000 email appliance. (see http://www.mirapoint.com for more information). The M1000 is a dedicated standards-based email server which will scale easily to support the growing workload we are experiencing with email. The M1000 is designed exclusively for sending, receiving and storing email. Features such as auto-reboot , RAID, and single-purpose software will provide our users with greater reliability and service. Support will be simplified, security increased (there is no root account to hack) and it can be backed up by the Campus Legato system.

**Proposal Benefits:**

The benefits of the proposed server are both for users and system administra:

- improved reliability, response time and security for users
- scalability for the future without major upgrades
- simplicity of management and support (system upgrades, backup) - lowers cost of ownership.
- spam screening capabilities

**Cost Breakdown:**

The request to WEEF is for a portion of the cost of the email server

| Description | Cost(US) | Incl Taxes |
|---|---|---|
| Mirapoint M1000 Internet E-mail Appliance | $22,900 | $37,145 |
| System unit, embedded operating system and Mirapoint software<br>384 MB Memory<br>1 RAID 5 controller, 1 external UPS<br>36GB User space (2 active + 1 parity + 1 hot spare 18GB HDs) | | |
| Contribution from Engineering Computing | | → $29,645 |
| Contribution from WEEF (S99) | | $2,500 |
| Request from WEEF F99 | | ***$5,000*** |

**Implementation Schedule:**

Implementation would take place over the winter term 2000.

Implementation time?
Summer 2000.

## TEAMS

### *Proposal #5*

**Title:** Proposed University of Waterloo Mini-Baja Design Team

**Submitted By:**
Name: The Proposed Mini-Baja Design Team
E-mail: knmcbrid@engmail.uwaterloo.ca
Phone Number: (519) 496-3160
Position: Leadership Committee

**Description of Proposal:**
A proposal has been put forth to both Systems Design and Mechanical Engineering Departments to take over the SAE Mini-Baja Design Project from the Mechanical Engineering Department. Upon talking with the heads of both departments, it is believed that the proposal will be accepted. By the date of the WEEF presentations, the design team should know whether or not it will be awarded the project. Should the proposal be accepted, funding will be required to cover administrative costs such as photocopies and printing, press kits for fundraising, and filing and presentation materials.

**Proposal Benefits:**
The primary beneficiaries of this project will be the project members. At the initial meeting, approximately 40 people showed interest in getting involved with some or all of the aspects of the project. Therefore the commitment to the project has been clearly established. As the participants develop technical and leadership skills, they will become better engineers. This project will also provide recognition to the Faculty of Engineering and its staff. The outstanding reputation that the University of Waterloo's Faculty of Engineering enjoys will be bettered by the success of yet another extracurricular project such as the SAE Mini-Baja. By WEEF providing the initial funding, the Design Team will have the necessary resources to reach out to the corporate sector for further funding in the more expensive aspects of the project.

**Cost Breakdown:**

| | |
|---|---|
| Printing | Approx. 300 sheets @ $0.08/sheet = **$24.00** |
| Photocopies | Approx. 250 sheets @ $0.07/sheet = **$17.50** |
| Filing Materials | Approx. 20 folders @ $0.50/folder = **$10.00** |
| Press Kits For Fundraising | Approx. 20 kits @ $5.00/kit = **$100.00** |
| ~~Presentation Materials~~ | Approx. **$25.00** |
| Total | **$176.50** |

100% Systems.

## Implementation Schedule:

### Objectives

Our key objective is to be successful in the SAE Mini-Baja design competition. We realize that in order to reach this goal we must set and meet a number of other goals along the way. As with the organization's structure, these goals will evolve as we learn more about the needs of our design. The following goals are simply a guide from which to begin.

| Date | Specific Goal |
|---|---|
| Friday, November 12/99 | - The 3 research teams (the SAE research team, the resource research team, and the preliminary technical research team) will have completed their work and will make a presentation to the rest of the organization<br>- We will have submitted the proposal and will have more details about our status with regard to the project. |
| End of 1A (Dec '99) | - Organize all the specific departments so that they can begin researching their areas during our first work term.<br>- Begin basic research about each of the components of the vehicle. |
| End of 1B (Aug '00) | - Make contacts at other universities which have Mini-Baja vehicles and visit those universities to meet with their project leaders.<br>- Obtain access to the previous Mini-Baja vehicle (as suggested by Professor Gordon Andrews of the mechanical engineering department) and study its design. By doing this we will develop a tactile appreciation of the car.<br>- Actively search for a place to assemble the vehicle. |
| End of 2A (Apr '01) | - Complete our working design for the first version of the Mini-Baja vehicle.<br>- Begin machining and assembling the different components.<br>- Continue to search for a place to assemble the vehicle. |
| Work Term (May '01) | - Send a small team of observers to the SAE Mini-Baja competition with a video camera to learn from the successes and mistakes of other teams |
| End of 2B (Dec '01) | - Assemble the Mini-Baja vehicle and prepare it for testing. |
| End of 3A (April '02) | - Have the car 100% ready for the competition in May 2002. |
| May '03/'04 | - Having learned from previous competitions we will redesign aspects of the dune buggy and re-enter the competition in subsequent years. |

## *Proposal #6*

***Title:*** ***Team Advancement For The Formula SAE Project***

**Submitted By:** Formula SAE Team 2000
Your Name: Jonathan Hook, Jeremy Schmidt
E-mail: sae@engmail
Phone Number: x5904
Position: Formula SAE Team 2000 co-leaders

**Description of Proposal:**
Dampers – purchase of 5 Noleen NR4 dampers for suspension system.
Data Acquisition Cables – purchase of 12 cables for interface with data acquisition computer.
Differential – purchase of Zexel Torsen limited slip differential.
Honda CBR600 F3 Motorcycle Engine – purchase of used engine for competition.
Racing Suits – purchase of 1 fire retardant racing suit.
Tools – purchase of air and hand tools for construction of car: Air Ratchet
Impact Wrench
Pneumatic Cut-off Tool
Assortment of Files

**Proposal Benefits:**
Dampers – The purchase of dampers will allow off-season testing to be done aiding in the refinement of current and future suspension designs. As well, the dampers can be used on the 2000 car for competition purposes.

Data Acquisition Cables – The data acquisition cables will allow for permanent instrumentation of the car allowing for greater flexibility in testing and design analysis. Currently, Waterloo falls far behind other schools in its ability to maintain on-board instrumentation, thus hampering our success. Future teams will benefit significantly from the ability to conduct more extensive testing than past teams have been able achieve.

Differential – The differential will serve to replace the team's current differential which is a number of years old and worn out. A new differential will last long enough to serve the needs of future teams for a number of years. Development is underway by Team 2000 on a lightweight differential casing which would be cheaper for future teams. Having a replacement differential would allow for disassembly of the old differential for development of the new casing.

Honda CBR600 F3 Motorcycle Engine – The engine is an essential part of any car. This engine will serve the team in a number of ways. It will be the race engine for the 2000 competition. Its purchase will allow for more extensive testing to be conducted on the team's current backup engine and allow the 1999

car to remain in complete road-going condition for testing and driver training by future teams.

Racing Suits – Fire retardant suits are required for the FSAE competition. The team's current suits are a number of years old, worn out and have a number of holes, thus rendering them unsuitable for competition. Not to mention, it hurts our image. Partial funding was received last term for 1 racing suit. A second suit is required since we have some rather large team members and their size must be accommodated to train and compete safely.

Tools – The tools are required for more efficient construction of the car. The relatively recent addition of an air line to the FSAE room allows for the use of the air tools. The files and pneumatic cut-off tool will prove especially useful during the construction of the tube frame chassis. The files will augment the team's current inventory of files, many of which are worn or broken after years of use and need to be replaced.

**Cost Breakdown:**

| Item | Cost |
|---|---|
| Dampers (5) | $1200.00 |
| Funding Option: Any number of dampers at $240.00 each. | |
| Data Acquisiton Cables (12) | $650.00 |
| Differential | $610.00 |
| Honda CBR600 F3 Motorcycle Engine | $1800.00 |
| Racing Suit | |
| Suit | $350.00 |
| Gloves | $86.00 |
| Shoes | $170.00 |
| Arm Restraints | $45.00 |
| Tools | |
| Pneumatic Belt Grinder | $95.00 |
| Impact Wrench | $95.00 |
| Pneumatic Cut-off Tool | $95.00 |
| Assortment of Files | $102.00 |
| Funding Option: Any number of files at $17.00 each. | |
| Total: | $5298.00 |

## Implementation Schedule:

The items listed above would be purchased as soon as possible. Each item would have an immediate positive impact on the 2000 FSAE team as well as future teams.

## *Proposal #7*

**Title:** **Midnight Sun VI Solar Car Project**

**Submitted By:**

Name: Connie Kwan
E-mail: cmkwan@uwaterloo.ca
Phone Number: (519) 888 - 4567 x 2978
Position: Business Manager

**Description of Proposal:**

The Midnight Sun Solar Car Project strives to design, build, and race a winning solar car. To this end, over 100 University of Waterloo students, primarily engineers, lends their efforts. As the World Solar Challenge (WSC) wraps up in Australia, and Midnight Sun V crew returns to campus, plans for Midnight Sun VI are already in gear. Midnight Sun VI aims to improve upon the design of Midnight Sun V, and again, compete in Sunrayce and WSC. Half of the Midnight Sun VI crew consists of Midnight Sun V members and half consists of new members. Building on solid engineering practices, the latest in computer aided engineering, a wealth of past experience, and an influx of new ideas, the team is poised for the new challenge ahead. However, in our current financial position we are unable to purchase all the components that will aid in our success in the next solar race. Thus we approach WEEF for funding in the purchase of Sun Ram and Radio Modems.

***Sun Ram***

Midnight Sun is acquiring a new Sun system; however, we are only receiving 128MB of ram. To perform the crucial Computational Fluid Dynamics analysis for designing Midnight Sun VI, at least 512MB to 1GB of ram is necessary.

Having this ram will allow for accurate simulations of the car's aerodynamics and thus a better idea of how the car will perform. Currently only sections of the car, or the whole car with a very coarse grid, can be tested in the software. This partial test is not accurate. Simulations that are more accurate are necessary as more prototypes can then be tested without actual construction of the prototype. These simulations yield a more optimized aerobody.

In addition to above benefits to Midnight Sun, the Sun system will also benefit other teams. WEEF is assured that funding for Sun ram benefit not only Midnight Sun but also other student projects on campus. As examples, the glider team has already asked to use the Sun system and the Formula team can also use it for their CFD work.

***Radio Modems***

The solar car currently has a telemetry system, which acquires and logs the various data of the solar car, such as the battery voltage and current. A digital radio link is required so that the telemetry system in the solar car can transmit data to a computer in the chase vehicle following the solar car. The data can then be analyzed in real time and race strategy can be determined accordingly. A desirable data link would be RS-232 compatible with data rate of 9600 baud or higher.

**Proposal Benefits:**

Students from many faculties are involved in designing and building subsystems for Midnight Sun. Currently, the team consists of about 85 engineering students from all disciplines and approximately 15 non-engineering students from the faculties of Arts, Science, and Mathematics. Our tenth place overall finish Sunrayce 99 encourages 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. The investment by WEEF in the Radio Modems will make Waterloo a stronger competitor in Sunrayce. And since Midnight Sun represents University of Waterloo Engineering, a successful team gives Waterloo greater exposure.

In addition, WEEF's investment in the Sun ram not only benefits Midnight Sun but also other University of Waterloo student projects that require this powerful resource. WEEF's investment in Sun ram will benefit University of Waterloo as a whole by increasing up-to-date and accessible technology for student research.

**Goals of Midnight Sun VI:**

- To design, build, and race a winning solar car for Sunrayce 2001 and possibly WSC
- 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
- To further alternative fuel technologies through research and development efforts

Students who work on this project develop manufacturing techniques and rigorous validation systems in order to produce a winning design. Students also benefit through working with industry contacts, professors, graduate students, and each other.

**Cost Breakdown:**
Approximate costs outlined. Exact costs will be discussed at presentation.
Partial funding is appreciated as well.

| | Item | Quantity | Amount | |
|---|---|---|---|---|
| ***Plan A*** | | | | ***Total: $*** |
| | Sun ram<br>$600 / 128 MB | 1GB | 4200.00<br>~~$4,700.00~~ | $5,700.00 |
| | Trailor<br>~~Radio Modem~~ | | 1500<br>~~$1,000.00~~ | |
| **Plan B** | | | | ***Total: $*** |
| | Sun ram<br>$600 / 128 MB | 512MB | 2100.00<br>~~$2,400.00~~ | ~~$3,400.00~~<br>36 |
| | Trailor<br>~~Radio Modem~~ | | 1500<br>~~$1,000.00~~ | |
| **Plan C** | | | | ***Total: $*** |
| | Sun ram<br>$600 / 128 MB | 512MB | 2100.00<br>~~$2,400.00~~ | $2,900.00<br>2100 |
| | Trailor.<br>~~Radio Modem~~ | | ~~$500.00~~ | |

**Implementation Schedule:**
Items being requested will be purchased immediately upon the availability of funds. Please note that Sun ram is critical to the improvement and optimization of the aerobody for Midnight Sun VI
and is required for the current design phase.

**Additional Information:**
Midnight Sun would like to thank WEEF for its on going support of Midnight Sun. As a result of contributions made by WEEF to Midnight Sun, WEEF is currently a **Silver Sponsor.**

SAE gets old trailor.

## *Proposal #8*

**Title:** **2001 Concrete Toboggan**

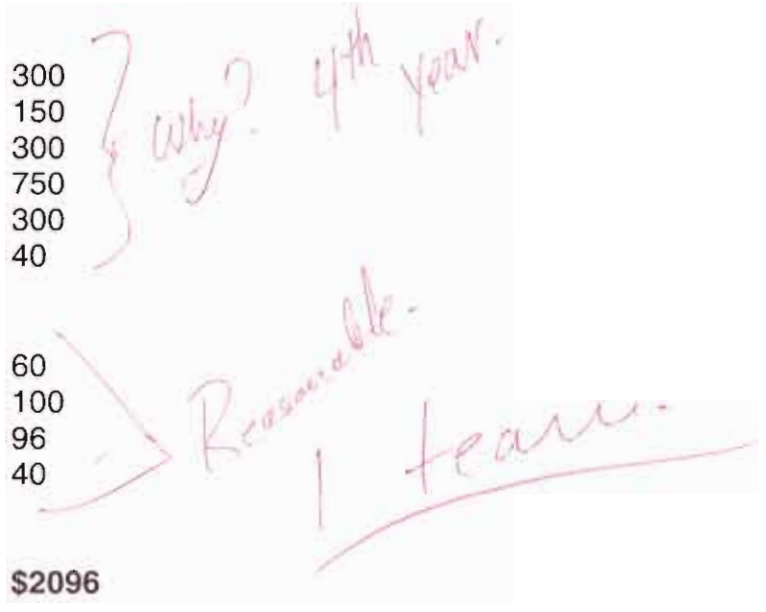
**Submitted By:**
Name: Gordon Turner
E-mail: gmkturne@engmail
Phone Number: (519) 725-2637
Position: Civil 3B WEEF rep

**Description of Proposal:**
Concrete Toboggan Funding

**Proposal Benefits:**
Assist 2001 Concrete Toboggan Teams.

**Cost Breakdown:**

| | |
|---|---|
| Weilding 20 hrs @ $15/hr | 300 |
| Cement paste 3 bags @ $50/bag | 150 |
| Steel/Aluminium (superstructure) | 300 |
| 5 Motorcycle helmets @ $150/helmet | 750 |
| Aggregate | 300 |
| Wax | 40 |
| ***Sub Total $1800*** | |
| Letterhead – 400 shts @ ¢15/sht | 60 |
| Printing costs | 100 |
| Postage 200 stamps @ ¢48 | 96 |
| Envolopes 200 @ ¢20 | 40 |
| ***Sub Total $296*** | |
| **Grand Total** | **$2096** |



## *Proposal #9*

**Title:** **GNCTR 2000 TEAM**

Submitted By: GNCTR 2000 Team, Stone Cold
Your Name: Stacey Condie
E-mail: secondie@engmail.uwaterloo.ca
Phone Number: 883-0910
Position: Finance & Fundraising Executive

**Description of Proposal:**
The Stone Cold Team would like WEEF's support in order to attend the 2000 Great Northern Concrete Toboggan Race in Regina. The Stone Cold Team would like WEEF to donate money to aid in the transportation of our team to and from Regina.

**Proposal Benefits:**
The Stone Cold Team will be representing the University of Waterloo for the 2000 Great Northern Concrete Toboggan Race in Regina. This race displays the skill, ingenuity and resourcefulness of Civil Engineering students. This competition allows the UW fourth year Civil class to apply acquired knowledge in the areas of design, analysis, report writing, and marketing. It is without doubt that the University of Waterloo has set a standard of excellence in all of its endeavors. It is our hope that the Stone Cold Team's relentless effort and dedication will once again see us to the top of the coming year's competition.

**Cost Breakdown:**
The cost of a return flight to Regina (leaving from Toronto) is $373 per person. Our team is requesting from WEEF a donation of $2984 in order to send 8 people from our team to the Races. We are attempting to send a total of ~~33~~ 32 Civil Engineering students to this competition.

**Implementation Schedule:**
The Great Northern Concrete Toboggan Race in Regina is being held February 2-6, 2000.

**Additional Information:**
In return for your support, the Stone Cold Team has developed a number of ways in which we would be able to provide exposure for WEEF. They are as follows:

- Proudly displaying the WEEF logo on the team uniforms and toboggan
- Representation at the technical exposition kiosk in Regina
- Including the WEEF logo and profile on our Website

Currently the team has raised money through boggan burger sales, a car wash, dunk-a-prof, and corporate/ organization sponsors. Also each team member will be paying $200 towards his or her entry fee and hotel expenses.

## *Proposal #10*

**Title:** ***CSC2000 Clean Snowmobile Challenge***

**Submitted By:**
Name: Scott Hue
E-mail: sdhue@engmail.uwaterloo.ca
Phone Number: (519) 576-8998
Position: CSC Team Manager - 4A Mechanical Engineering

**Description of Proposal:**
The Clean Snowmobile Challenge 2000 is a competition initiated by Yellow Stone National Park and the Society of Automotive Engineers (SAE). The focus of this competition is to improve emissions, fuel economy and reduce noise levels of a two-stroke snowmobile engine while maintaining or improving performance. The modified snowmobile will compete in the annual Jackson Hole World Championship Hill Climb in Jackson, Wyoming. The competition is scheduled to take place on March 25, 2000.

I would like to propose that WEEF assist the team in the purchase of several necessary items that will enable the team to compete in the challenge. In particular we would like WEEF to assist the team in the purchase of a ***Motec*** controller.

**Proposal Benefits:**
A Motec controller is a state of the art control system that controls ignition timing on an engine. All cars have controllers that monitor various input signals such as manifold pressure, engine temperature and exhaust temperature and then control the ignition timing accordingly. However, these controllers cannot be modified once the manufactures have 'burned' in its program settings.

The Motec controller is programmable, it allows the user to choose the sensor inputs and to modify the engine performance characteristics over and over depending on the situation or use. As such the Motec controller is extremely flexible, it would not only be applicable to our team but to all teams requiring engine tuning and modifications. The ethanol team would especially benefit from its use. An additional suggestion has also been made that when it is not being used for team purposes it could be set up as a demonstration for students. Students could see how slight variations in (for example) the amount of fuel delivered to the cylinder would affect the performance of the engine.

There are six Mechanical Engineering students participating on the team in each stream. Four students are currently completing their required ME481 projects for the team.

**Cost Breakdown:**
Total Cost for Motec Controller: $7250.00 / $8337.50 with tax
Safety Jacket and 2 Helmets: $360.00 / $414.00 with tax
Miscellaneous tools: $500.00
- torque wrench, socket set, wrench set, and soldering iron

Travel to Competition: $12000.00
- lodgings for 3 nights, plane tickets for min. of 3 students, shipment costs of snowmobile
- competition occurs right before and during final exams

***Total Costs without Travel: $9251.50***
***Total Cost with Travel: $21 251.50***

**Expected Sponsorship Contribution: ~~$5000.00~~ from Long Manufacturing**

**Amount requested from WEEF Option 1: $4600.00** *to cover half the cost of the costs without travel*
**Amount requested from WEEF Option 2: $9251.50** *to cover costs without travel and to allow us to use money from Long Manufacturing to help pay for travel costs*

Implementation Schedule:
Purchase Motec Controller as soon as funding is available.
Purchase helmets and safety jacket by December 1, 1999 to enable safe testing of machine.
Finalize travel arrangements and purchase tickets by January 10, 2000.

**Additional Information:**
Until recently there has been little attention given to the adverse effects that two-stoke recreational vehicles have on the environment. This recent concern has sparked research and development on two-stoke engines. However, there is still not an industry consensus on the best method to achieve these new goals. As this is a new competition for both Waterloo and for the organisers it has been a slow road to find adequate industry response to both technical and financial assistance.

The financial rewards for placing well in the competition are high, as much as 23 000.00 US dollars. This year is a unique situation, and as such we are strongly dependent any contribution that WEEF can give. Performing well in this competition will ensure that future Waterloo teams will be able to stand-alone financially without depending on WEEF.

Ethanol & SAE will use.

## ELECTRICAL ENGINEERING

### Proposal #11 - A

**Title:** **E&CE '30 Series Semiconductor Parameter Analyzer**

**Submitted By:**
Name: Paul Hayes
E-mail: phayes@ece.uwaterloo.ca
Phone Number: ext. 3969
Position: Lab. Staff

**Description of Proposal:**
The curve tracers in E2-3347 and E2-3348 are due for upgrading. They are 30 year old, Tek 577/D2/177. I would like to upgrade to the HP 4145A Semiconductor Analyzer. The proposal is to purchase two used units for $10,000 U.S.

**Proposal Benefits:**
All the students in the '30' series classes will be using these units. The ECE 231 class can be over 200 and the ECE 332 class can be over 200 during some terms. The older units may not last much longer. It would be better to be using equipment from 1985 rather than equipment from 1970. If we were to cover the increase in class size with the purchase of two 30 year old used Tek 577 they would still cost us $5,500Can. per Tek 577.
The HP 4145A units have a computer HP-IB interface for hard copy to computer printer. The HP 4145A can measure smaller currents and voltages.

**Cost Breakdown:**
$10,000 U.S. per HP 4845A.

**Implementation Schedule:**
Winter 1999.
Additional Information:
I have one Tek 576 on long term loan in case there is a crisis.

## *Proposal #11* - 2

**Title:** **E&CE Public Computer Room Upgrade**

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

**Description of Proposal:**
The public computers in E2-2360 and E2-2362 are due for upgrading. They are 3.5 year-old Pentium 133's with 32M of RAM. Within the past year the E&CE Dept. upgraded all of the monitors to 17" ones and now we are looking for support to upgrade the computers to Celeron 400's with 64M of RAM

The proposal is to purchase new computer parts (CPU, M/B, RAM, video, HD, mouse) and install it in the old cases. The CPU speed will be whatever is reasonably cheap at the time (currently 400MHz).
The old computer parts will get trickled down to replace older 486 machines and staff computers.

The old cases are being reused to save the costs of re-engineering all of the lockdown & security hardware.

Cost comparison for CPU upgrades that would not be significantly faster:

| | |
|---|---|
| P2 instead of Celeron; | + 20% |
| Upgrade to Celeron 500 or P2-450 | + 25% |
| Upgrade to P2-500 | + 40% |
| Upgrade to P3-450 | + 95% |

**Proposal Benefits:**
Faster and more capable computers for the shift to Win 95 software which requires more RAM (digital design courses such as E&CE 222, 223, 324, 427, etc) and better video cards to take advantage of the new monitors.
One machine will trickle down to be a firewall for laptops.

**Cost Breakdown:**
$750 per Celeron 400 computer.

Groups of 5 units, upto 15, are preferred. I.e. 5 units ($3,750), 10 units ($7,500), 15 units ($11,250)

1 now done 333 MHz.

**Implementation Schedule:**
Winter 1999. I.e. I'll wait for RAM prices to drop. (They are up by 2.5x right now due to an earthquake.)

Additional Information:
5 Pentiums in E2-2362 have already been upgraded by the department.

## *MECHANICAL ENGINEERING*

### *Proposal #13*

**Title:** **Data Acquisition System for Instrumentation Demonstration and Thermal/Fluids Design Projects**

***Submitted by:*** ***M. Kaptein, Mechanical Engineering***
E-mail: rkap@surya.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

**Description of Proposal:**
A PC based data acquisition system is requested for demonstrating temperature, velocity, flow and pressure transducers in several Thermal/Fluids undergraduate courses including ME 351, ME 362, ME 563 and ME 569. The system will also be available to students involved in Thermal/Fluids design projects (e.g. ME 481)

The proposed system includes Sensoray Smart A/D PCI data acquisition cards and a dedicated P3 computer. The main advantages of the Sensoray cards are low cost and
flexibility of use for all of the following:

- temperature measurement using thermocouples, RTD's or thermistors
- voltage inputs and excitation for velocity, flow and pressure transducers
- strain gauges
- current loops (4-20mA)

Transducer linearization, calibration, and sensitivity are software programmable. Signal conditioning is provided for thermistors, RTD's thermocouples, strain and pressure, resistance and voltage inputs.

**Benefits of the Proposal:**
All mechanical undergraduate students in ME 351, ME 362, ME 563, ME 569, ME 481 and ME 482 will benefit from this system.

**Cost Breakdown of Proposal:**
The total cost of the system including 32 channels of differential input with 16-bit A/D resolution, cabling, termination boards (with thermocouple cold junction compensation), Win95/NT compatible software, a dedicated P3 computer and various temperature, pressure and flow transducers is **$5,500.00**.

**Implementation Schedule:**

December 1999

used for 481's & 482's.

concern over P2.

Partial Funding Available.

## *Proposal #14*

**Title:** **Fluid Dynamics Media Presentation**

**Submitted by:** **M. Kaptein, Mechanical Engineering**
E-mail: rkap@surya.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

**Description of Proposal:**
Since the early 1960's Mechanical Engineering has had super 8mm fluid mechanics instruction and demonstration material. At some time in the 1980's they were rebroadcast on videotape. However the quality of the instruction material is not very good.

Professor MacDonald is requesting new engineering video material to give more recent coverage of the subject of fluid dynamics. The Insight Media Company offers several choices; we would like the following:

a) Fluid Quantity and Flow Fluid Mechanics
b) Fluid Dynamics of Drag

**Benefits of the Proposal:**
The above mentioned videos (**a** and **b**) can be used for ME 351 and ME 569, video **c** can bed used as an introduction to ME 362.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| a) Fluid Quantity and Flow (Video) | $ 249.00 (U.S.) |
| b) Fluid Mechanics (Video) | 269.00 (U.S.) |
| c) Fluid Dynamics of Drag (Video) | 299.00 (U.S.) |

***Total in Canadian Dollars including tax $1,446.00***

**Implementation Schedule:**

December 1999

Fluid clips already on C.D.

Will match all money.

## *Proposal #15*

**Title:** **Upgrade Printer in Rolling Lab**

**Submitted by:** M. Kaptein, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

**Description of Proposal:**
Purchase one HP LaserJet 1100 printer for rolling lab to replace obsolete dot matrix printer.

**Benefits of the Proposal:**
This facility is used by ME 340 (85 students) twice a year and ME 541 (20 students) once a year, a total of 190 students per year. This printer would provide faster, clearer printing and more reliable performance. Accessories would be cheaper and easier to find.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| HP LaserJet 1100 printer | $ 550.00 |
| Switchbox | 25.00 |
| Cables | 40.00 |

***Total including taxes $680.79***

**Implementation Schedule:**

December 1999.

Seems good!

## *Proposal #16*

**Title:** Upgrade Computers in CAD Design Studio, Room 1101, E3

**Submitted by:** M. Kaptein, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

**Description of Proposal:**
Civil and Mechanical Engineering with assistance from WEEF developed a Cad Design Studio in E3, Room 1101. This studio is to support design courses and student projects by providing a controlled room with CAD facilities and a design environment.

The room has 12 computers (8 P11's and 4 P1-166), we need to upgrade the 8 P11's to facilitate project students use of IDEAS. The hardware upgrade required to run IDEAS on an NT based workstation is additional memory, better video card and a larger hard-drive for swap space.

**Benefits of the Proposal:**
An improved CAD facility to provide flexibility for students in specific courses and all 4th year students.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| 8 (128 MB SDRAM) @ $349.00 | $ 2,796.00 |
| 8 ATI Fury 32M6AGP @ $188.00 | 1,504.00 |
| 8 Quantium 6G19 HD @ $149.00 | 1,192.00 |
| **Total cost including taxes** | **$ 6,315.00** |

**Implementation Schedule:**

December 1999.

## *Proposal #17*

**Title:** **Upgrade Mechanical Electronic Classroom**

**Submitted by:** M. Kaptein, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Lab Director, Mechanical Engineering

**Description of Proposal:**
Four years ago Mechanical Engineering created a new and different teaching environment for engineering students. The classroom provided a multitasking environment for teaching using conventional methods, instructions using Classnet computer systems and student stand alone facilities. The room was then fitted with Pentium 120 MHz computers. If we want to keep the facility current for the next few years we should upgrade it **now** while the 233 Pentium chips are still available. For performance sake we should upgrade the memory to 32MB.

**Benefits of the Proposal:**
Improved and prolonged teaching environment for undergraduate students.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| 50 x $71.00 | $ 3,550.00 |
| 50 x $76.00 | 3,800.00 |
| ***Sub Total $7,350.00*** | |
| **Total** | **$ 8,232.00 (Taxes Included)** |

**Implementation Schedule:**

December 1999

Buying time.

## *Proposal #18*

**Title:** **Waste Management Education Research Consortium 2000 – Environmental Competition**

**Submitted By:**
Name: Northern Exposure Consultants (NEC) Alicia Fraser
E-mail: aafraser@env
Phone Number: 519-725-5947
Position: Project Manager

**Description of Proposal:**
We are requesting funds to assist us in the development of the design of an acid mine treatment facility for an abandoned open pit mine in New Mexico, as a part of the WERC competition. This project looks at the remediation of an abandoned sulfide-mine. There is now some concern that this contaminated water may spillover and infiltrate the neighbouring community's drinking water supply. Major requirements that must be met are:

- production of water that would be acceptable for irrigation in the neighboring town,
- recovery of saleable metals,
- disposal of the remaining sludge and treatment by-products environmentally, and
- compliance with state and federal laws and regulations

utilizing economical and feasible treatment and discharge methods.

Following the completion of the environmental assessment, preliminary laboratory analysis, and the determination of the best method of extraction and treatment of the waste, NEC will design a bench scale model of the selected treatment. Upon completion of the project, WERC will be provided with a final report, a bench scale model, and a poster board presentation. NEC will also conduct an oral presentation discussing all relevant experimentation, testing, results, conclusions, and recommendations.

**Proposal Benefits:**
- Provide an ongoing "Environmental Project"
- International competition will bring recognition to UW's efforts in Env. Engineering
- Demanding and practical env. Design experience applied to actually assist a realistic situation

**Cost Breakdown:**

| | |
|---|---|
| 1) Materials for Model | $1,500 |
| 2) Test equipment & reagents | $1,000 |
| 3) Transportation of Model | $ 250 |
| 4) Storage of Model | $ 150 |
| 5) Materials for presentation | $ 100 |
| Option 1 Total | $3,000 |
| Option 2 (incl 1, 2) | $2,500 |
| Option 3 (incl 1) | $1,500 |

What other funds raising will be done?

Travel?

# currently evolved 4 people

**Implementation Schedule:**

| | |
|---|---|
| 1) Finish design | Nov 1999 |
| 2) Finish Model Construction | Jan 2000 |
| 3) Test Model | Feb 2000 |
| 4) Finish Model | Mar 2000 |
| 5) Competition | Apr 2000 |

Civil Department - given
other - fundraising
20 - 30 schools.

## *Proposal #19*

**Proposal Title:** **Rolling Mill Control System**

**Submitted by:** Prof. J.G. Lenard, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Professor, Mechanical Engineering

**Description of Proposal:**
Students taking ME 340 and ME 541, use a rolling mill for part of their course instruction. The mill lacks a proper control environment to ensure consistent performance for students using this facility. The newly added control system will enhance the accuracy of the data and improve control of the mill's roll gap.

**Benefits of the Proposal:** [645]
All students taking ME 340 and ME 541 will benefit from this control system. ME 482 project student will also benefit.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| Quasar Data Acquisition Card | $1,680.00 |
| Pentium Computer | 2,000.00 |
| Taxes | 522.00 |
| **Total (including taxes)** | **$4,232.00** |

> card & computer

[URA's & 645]

**Implementation Schedule:**
December 1999

## *Proposal #20*

**Title:** **Videotape Series – Non-destructive Testing**

**Submitted by:** Prof. N. Zhou, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Professor, Mechanical Engineering

**Description of Proposal:**
ME 537 – Welding Fabrication and Quality Control was developed and taught for the first time by Dr. N. Zhou from January 1999 to April 1999, as part of the requirement for an undergraduate specialisation in Welding Engineering. The course was well received by students, but N. Zhou feels that an improvement is needed because this is a complete new course and we are still weak in terms of experience and lab facilities. N. Zhou has submitted a grant to the American Society for Non-destructive Testing, Inc. (ASNT) to purchase an ultrasonic flaw detector (cost about $8,000.00 US). Here, N. Zhou proposes to WEEF Undergraduate Project Funding to purchase a series of videotapes developed by ASM covering fundamentals of NDT, welding inspection and quality control to improve both lecturing and lab teaching.

**Benefits of the Proposal:**
Improved teaching environment for ME 537, ME 481 and ME 482 students.

**Cost Breakdown of Proposal:**
Videotapes and printed materials **$2, 290.00 (US)**

**Implementation Schedule:**
December 1999

Seems excessive.

## *Proposal #21*

**Title:** **Teaching Tools – Room 2318, E2**

**Submitted by:** Prof. R. J. Pick, Mechanical Engineering
E-mail: rkap@surya.uwaterloo.ca
Position: Chair, Mechanical Engineering

**Description of Proposal:**
Students enrolled in ME 481 and ME 380 are required to make a design presentation proposal and a final presentation of their course project. We have had considerable success this term with the ME 481 projects presented in PowerPoint. We would like to do the same in ME 380. Unfortunately we have to borrow a notebook from a faculty member and get a projector from Audio Visual. The use is becoming so
extensive that we cannot borrow this equipment for extended periods. Our concept is to develop a moveable lectern that would have a built in PC and projector. We could than move to any conference room for the design presentations. This would minimize set up time and provide a facility for students to practice on.

**Benefits of the Proposal:**
All students taking ME 481 and ME 380 will benefit from this new equipment. Civil Engineering will also share the benefits of this proposal.

**Cost Breakdown of Proposal:**
A moveable lectern with projector and computer **$7,500.00**

$1500.00 ← Projector

**Implementation Schedule:**
December 1999

Mechanical. Owns

## *Proposal #22*

**Proposal Title:** **Fuel Cell Demonstration Project**

**Submitted by:** Professor Xianguo Li, Mechanical Engineering
E-mail: x6li@mecheng1.uwaterloo.ca
Position: Professor, Mechanical Engineering

**Description of Proposal:**
Purchase equipment to construct a fuel cell for classroom demonstrations and for final year projects.

**Benefits of the Proposal:**
Provides the ability to provide experience with the latest technology in fuel cells. The fuel cell arrangement will allow design modifications and measurements to be made for final year projects.

**Cost Breakdown of Proposal:**

| | |
|---|---|
| Membrane-electrode assembly | $ 7,492.00 |
| Flow Distribution Plates | 2,040.00 |
| Instrumentation and controls | 3,963.00 |
| GST and Shipping | 1,158.00 |
| **Total** | **$ 14,653.00** |

800/level course.

~~$~~ 5,725

**Implementation Schedule:**
Spring Term 2000

**Additional Information**
Fuel cells are currently under development for use in buses and automobiles. Commercial vehicles are expected within 5 years. Considering the growing interest in fuel cell technology, we would like to introduce a demonstration in ME 459 (Energy Conversion) and have final year projects in fuel cell development. There is no one company that can supply a complete unit. Therefore it will be necessary to purchase components and construct the unit. This will be a rich source of final year projects.

Because of the high cost we may spread this request over 2 terms.

Spread over 2 terms.

## SYSTEMS DESIGN ENGINEERING

## *Proposal #23*

**Title:** **Systems Design Engineering Ultra 10 Project Server**

**Submitted By:**
Name: Kevin Krauel Name: Monica Milanowski Name: Sanjay Singh
E-mail: kbkrauel@kingcong E-mail: mmilanow@enqmail E-mail: ssingh@zeus
Phone Number: X5760 Phone Number: X2234
Position: Lab Director Position: 4th-Year Student Position: Technician

**Description of Proposal:**
Our aim is to gradually replace the NeXT platform that has been serving the department for the last 8 years. The NeXT stations have fulfilled their role as an exploratory development platform for Systems Design Engineering students. The hardware is becoming unreliable, and its throughput cannot support recent research initiatives and software engineering methodologies.

We perceive a sustained need for a modern computing resource for undergraduate engineering students, one that was previously available only to UW graduate students. The acquisition of a Sun Ultra 10 workstation will be used to expand Systems Design Engineering students options for high performance engineering computing. Software packages will be installed to facilitate various kinds of advanced undergraduate investigations for workshop projects.

This station is envisioned to possess the following :

- Solaris 7 Operating System
- Common Desktop Environment 1.3
- 1 440 Mhz UltraSparc processor
- 512 Megabytes of 50 ns ECC RAM
- Creator 3D graphics board
- 9 Gigabytes of disk storage

**Proposal Benefits:**
The intended beneficiaries are 3rd and 4th year students in the Systems Design Engineering department, and other occasional students from outside the department who wish to do workshop projects. Over three terms, we estimate over 100 students will benefit from using this computer.

We expect that utilization of this computer by undergraduate students will consume at least 50% of its available resources. Dissemination of courseware for the benefit of undergraduate Systems students will require an additional 20% of its resources, particularly if dispensed concurrently with the application software running.

The Ultra 10 offers the following benefits:

*Developing and serving multimedia courseware using both HTML and XML and PDF that has been created by faculty or staff members

*X-terminal connectivity for remote access via Polaris and dedicated X-terms (i.e. Gaff lab)

*A modern Unix software development environment and technical computing resource for undergraduate students in Systems Design Engineering (and available to students in other departments on a per-request basis). The non-exhaustive list of possibilities includes:

- Circuit Design and Simulation: Xspice analog and digital mixed-mode simulation.
- Analog VLSI: Various tools are available for designing chips and ASICs, such as Chipmunk from CalTech.
- Neural Networks: Stuttgart Neural Net Simulator for designing and simulating most neural networks.
- Java: SunSoft Java WorkShop 3.0, Java Development Kit 2.0, and related API's for enterprise software development.
- UML: Distribute information about the Unified Modelling Language in combination with C++ or Java for Object-Oriented Software Engineering. Also, a UML modeller (Rational Rose) will be installed for students to use in their software projects.
- XML: Extensible Markup Language software will be installed for students to explore future Internet markup languages and to define a domain-specific mark-up language if necessary for their particular interest.
- Solid Modelling/Finite Elements: We would like to leverage the existing campus-wide I-DEAS license so that a high performance CAD solution can be used by more undergraduates. They can then export this model to other software such as CFX TASCflow or to ANSYS (also to be installed on the station) for structural analysis. Other CAD packages will be added in the future. Hazel Austin of Engineering Computing has agreed to re-configure the colour X-terms in the Gaff lab to access the new Sun machine as a host, pending approval of this request.
- Scientific Computing: Fortran and C++ code for numerical solutions to analytical models.
- Aeronautics: Xfoil 2D viscous flow modelling over user-defined airfoil geometries.

**Cost Breakdown:**
We project the following cost structure.

| | |
|---|---|
| Sun Ultra 10: | $8128.00 |
| 19" Colour Monitor | $1146.00 |
| Video Adapter Cable for Creator3D-to-19" display | $__50.00 |
| Taxes: | $1398.60 |
| Total: | **$10722.60** |

| | |
|---|---|
| 70% of the total cost will be supported by WEEF: | $7505.82 |
| 30% will be absorbed by Systems Design Engineering: | $3216.78 |

*For this project to be able to proceed, a minimum WEEF allocation of $5000 is required.*

**Implementation Schedule:**
Upon receipt of the hardware, integration into the Systems Design Engineering subnet will be completed within two days. Applications will be compiled and installed shortly thereafter.

Hard-copy and PDF versions of the relevant documentation will be made available to students to facilitate their work.
Additional Information:
Pricing information is based on UW Computer Store pricing as of 10/06/99.

In addition to a WEEF sticker, a message will be put in the /etc/motd file to acknowledge the assistance of WEEF. All users will see this message when the log in to the machine.

The machine will be administered by Sanjay Singh on behalf of Systems Design Engineering.

Polaris HP → in GAFF

## *CIVIL ENGINEERING*

### *Proposal #24*

**Title:** **Zip Drives**

**Submitted By:**
Name: Gordon Turner
E-mail: gmkturne@engmail
Phone Number: (519) 725-2637
Position: Civil 3B WEEF rep
Description of Proposal:
Civil Eng Computer Lab Zip Drives

20 Zip Drives. Is # reduced if

**Proposal Benefits:**
~~Assist 2001 Concrete Toboggan~~ Teams.

**Cost Breakdown:**
20 Iomega Internal Zip Drives @ 130 2600

| | |
|---|---|
| **Grand Total** | **$2600** |

## *Proposal #25*

**Title:** **Brookfield Viscometer**

**Submitted By:**
Name: Professor Susan Tighe
E-mail: sltighe@uwaterloo.ca
Phone Number: ext. 3681 (Bonnie Neglia, Admin Assist, CivEng)
Position: Assistant Professor, Civil Engineering

**Description of Proposal:**
This equipment is used to measure the viscosity of asphalt and other petroleum-based fluids. These properties are critical to the materials analysis process. For example: The viscosity of asphalt for road usage must be determined for optimum production, placement and performance.

The Brookfield Viscometer will be used by undergraduate students to examine the fundamental properties of paving materials, in particular, asphalt. The introduction of the test in CivE 126 (Concepts) will enhance co-op employment opportunities in the paving and related industries.

Proposal Benefits:
The Brookfield Viscometer will be used in undergraduate courses and student projects with a materials focus. All Civil Engineering graduates will benefit from the use of this equipment to gain valuable expertise with regard to structure, behaviour and uses of Engineering materials.

The following is a listing of Civil Engineering courses with a materials component:
CivE 126 (Civil Engineering Concepts)
CivE 265 (Structure and Properties of Materials)
CivE 407 (Building Science and Technology)
CivE 442 (Pavement Structural Design)

All Civil undergraduate students take CivE 126 and 265. CivE 407 and 442 are technical electives and attract approximately 80% of our undergraduate students.

**Cost Breakdown:**
($10,000) (Include partial funding options)
(2/3 WEEF, 1/3 Department of Civil Engineering)
M&L Testing Equipment Inc. - $10,000 (Quotation Reference: #7718)

**Implementation Schedule:**
Immediately.

**Additional Information:**

Contact Information for Funding if different than above:
Name: Dr. J. Sykes
E-mail: sykesj@uwaterloo.ca
Phone Number: ext. 3776
Position: Chair, Civil Engineering Department