VALUE ENGINEERING MECH 497 PROJECTS-Rank in order of preference. 18-01-15

[A] VE Project 123 Certification Inc.

Optical interface improvement of virtual reality welder training simulator (Claude Choquet, Remi Kerjean)

123 Certification supplies unique advanced software and hardware (HSW) to train welders in a virtually realistic simulator environment so as to acquire and sharpen skills especially on custom weld-ups peculiar to clients' products and needs. Project aims to enhance value of (improve) system accessories like welder's helmet, three types of hand held welding gun, welding rods and ARTAG, a crucial opto-coded motion tracking token that attaches to other accessories manipulated by the welder trainee. It is also intended to design suitable enclosures ("boxes, for want of a better word) for things like the high resolution micro-cameras that acquire images of ARTAGS for motion control. Ergonomic and aesthetic packaging of three levels (price and performance) of system offered may also be considered if activity does not digress too much from the project's primary aim of accessory enhancement. Constraints specified by 123 must be respected. Feasibility and attractiveness of 3D printing of everything may be addressed but note that actual welding helmets and guns may be obtained commercially for about $630 and adapted to their role in the simulator. 3D printing of challenging shapes is also an issue.
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[B] VE Project Terragon Environnemental Technologies Inc.

Final assembly process optimization of MAGS (Micro-Auto-Gasification System or reactor) an environment-friendly incinerator (Stephane Lavigne, Jason Phillip)

MAGS production in quantity begins this year. Main component manufacture has been outsourced and we are in the process of streamlining the process how and the area where t6he stuff is put together. Improving assembly efficiency will take advantage of things like getting pre-packaged "kits" of related (small?) components from suppliers, optimizing the assembly line layout, selecting and using the right equipment to lift and place components (robots?), looking at quality control of parts delivered. Maybe critical path method (CPM) can shorten time and reduce costs of the assembly process.

[C] VE Project Terragon Environnemental Technologies Inc.

MAGS consumables and replacement parts (Stephane Lavigne, Jason Phillip)

MAGS primary consumable substance is caustic soda or sodium hydroxide commonly called lye (NaOH). It is corrosive and nasty stuff that one does not want to get on body parts or anything like clothing, furniture, etc. There are rules and regulations that concern its shipping, handling and storage. Terragon wishes to obtain lye in the quantities, quality, form and at appropriate times and attractive cost in order to supply customers who have bought MAGS units and require safe, reliable and economical supply. The first step will be to find reliable suppliers world-wide. A supply management system/procedure, with Terragon the node in the middle, will have to be put in place in order that Terragon's MAGS enterprise can grow and flourish. This is a Canadian hi-tech enterprise that has relied heavily on development funding and now has the opportunity to create those high level jobs that governments always talk about but seldom deliver.

(… consumables & parts, contd.)

An important MAGS replacement part is the so-called “inflatable seal”. During operation tar can build up and cause the seal on movable door-like parts to stick to the surface it is meant to seal. This leads to tearing and seal material pull-off and deposit thereby compromising the sealing function. This part of Terragon’s second VE project is meant to resolve this issue by devising a means or applying some material to combat this type of seal deterioration

[D]VE Project Strong-MDI

IMAX screens and such (Genevieve Desroches)

A failsafe safety system is needed for a range of large motorized projection screens. Currently, screens are raised and lowered by a motor via a driveshaft which deploys a screen via wire cables. The failsafe system must be able to prevent the screen from deploying itself in the event of a mechanical failure to the motor or to the driveshaft linkage. An appropriate solution would be a sensor that constantly verifies driveshaft RPM in conjunction with a brake system. Electromagnetic caliper and rotor solutions tend to be cheaper when compared to other industrial brakes. They are also easier to adapt to our current product range due to their smaller size. An in-house solution would allow us to keep costs down whilst still being able to internally control the quality of our final product.
- Brake needs to be electric (Hydraulic solutions require extra hardware that will encumber the final product and might potentially leak on the screen)
- Minimum braking power: 280 lbs ft of torque
- Max. dimensions (Caliper + Rotor): 10” x 10”

[E]VE Project Aquaponics pure et simple

Pumping system optimization (Magdy Risk, Vince Thomson)

Aquaponic Pure et Simple is developing an aquaponics system for sale. Aquaponics combines conventional aquaculture with hydroponics in a symbiotic system. Aquaponic Pure et Simple’s system raises fish in a tank where the water containing fish excretions is used to mist the roots of edible plants being grown in large trays, thereby providing nutrients to the plants and removing waste from the fish tank. The system works 24/7. Tekdata has made a prototype.
This project will require student(s) who have completed MECH 321 Deformable Solids and have some experience in FEM application. The fish tank is designed in 4 sections where small fish start in section 1 and become large fish in section 4. Each section is progressively larger to accommodate larger fish. A pumping system moves the water through the tank, filters excretions, moves the water to mist the plants, and returns it to the fish tank. The tank needs to be made from fiberglass with clear windows in each section that enable monitoring of the fish. An automatic fish feeding system needs to be designed where each section of the tank is fed different food. The pumping system needs to be checked for efficiency.

[F]VE Project Aquaponics pure et simple

Horticultural tray design optimization (Magdy Risk, Vince Thomson)

This project will require student(s) who have completed MECH 321 Deformable Solids and have some experience in FEM application. The hydroponic system consists of 40 large trays that are sequentially moved from the misting station to a lighting area, and then, back to the misting station. The trays are to be made of fiberglass in order to make them strong and light, thus requiring less energy to move them through the system. The mechanism for moving the trays needs to be made lighter, more efficient and more robust.

McGILL UNIVERSITY VALUE ENGINEERING WORKSHOP 2018 winter

INPUT FOR ASSIGNMENT TO PROJECT TEAMS

FAMILY NAME_____ **GIVEN NAME(S)**_____

STUDENT NUMBER_____ **Please print**

For the purposes of balancing the talent on each team we need to know your ability to work in French, your preference for project type, a list of **required** courses that you have not yet completed, ability to use FEM software and briefly about your relevant work experience.

French: Yes[ ]/No[ ]

Preferred project type: Design[ ] Manufacturing[ ]

Missing required courses
MECH[ ], MECH[ ], MECH[ ], MECH[ ], MECH[ ], MECH[ ]
If more than a couple remain you should consider dropping MECH 497.

FEM in heat transfer: Yes[ ]/No[ ] FEM in stress analysis: Yes[ ]/No[ ]

Relevant work experience:

PROJECT SELECTION

Please write the letters, A, …, F, of the project below in order of preference, 1st , …, 4th .

First_____ Second_____ Third_____ Fourth_____

LIST OF PROJECTS AVAILABLE

A	**123Certification**	Development of simulator accessories
B	**Terragon-1**	Product assembly optimization
C	**Terragon-2**	Parts and consumables supply optimization
D	**Strong-MDI**	IMAX screen safety brake development
E	**Aquaponic-1**	Pumping system optimization
F	**Aquaponic-2**	Horticultural tray design optimization

Projects will be assigned 6 student team members and talents will be equally matched to the extent possible based on information submitted by you above. Your first or second choice will be respected, but it is sometimes necessary for some to accept 3rd or even 4th choice.