**VALUE ENGINEERING MECH 497 PROJECTS-Rank in order of preference. 22-01-14**

**[A] VE Project Arcelormittal**

**Iron Pellet Feeding System (Elias Abboud)**

Project title: Improvement of Continuous DRI Feeding System at the Contrecoeur West Steel Plant.

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Background: The existing system was installed in 2013 and is used to feed two silos with different materials, direct reduced iron (DRI) pellets and dolomitic lime. It consists mainly of a feed hopper (BC-1 in the figure below) and a belt conveyor (B-1 in the figure below). The conveyor starts at ground level with a horizontal span of around 20 ft followed by a vertical span of more than 200 ft. The current feed hopper design does not restrict the feed correctly for the different materials due to varying densities. Several problems are encountered including overcharging the conveyor and material overflow. In addition, the current power drive assembly is not designed to start at full load. If the conveyor stops when full, the motor is not able to restart since it is overloaded. A fluid coupling was installed in 2018 to act as a mechanical soft start, but it is not completely reliable. The project aims at identifying design solutions that could resolve these issues.

**[B] VE Project Pyrogenesis 1**

**Cooling Skid (Patrice Quintin)**

Pyrogenesis Canada Inc

Patrice Quintin

Mechanical Engineering Lead

As part of its plasma system, Pyrogenesis uses a cooling skid to cool down its thermal plasma torch. The cooling skid consists of a frame, water tank, centrifugal multistage pump, heat exchanger, piping and instrumentation, and control cabinet. The heat exchanger treats deionized water and uses tap water for cooling where the piping is SS 316 to prevent corrosion. At present, 5 cooling skids are built per year; however, with increasing internationals business, this number could grow up to 20 or more per year within five years. Due to entry into international markets, the cooling system must adapt to regional electrical requirements. The objective of the project is to design a cooling skid that is standardized as much as possible for international markets.

**[C] VE Project Pyrogenesis 2**

**Standardizing a Gas Cabinet (Patrice Quintin)**

Pyrogenesis Canada Inc

Patrice Quintin

Mechanical Engineering Lead

Since a plasma torch uses multiple gases to work properly, a gas cabinet is used to send the proper amount of each gas to the torch. The most common gases used in a torch are:

* compressed air
* helium
* nitrogen.

There are ten gas cabinets built per year. This number could grow up to 30 or more per year within five years. Since products will be sold internationally, the instrumentation must be adapted to local electrical requirements. The objective of the project is to design a gas cabinet that is standardized as much as possible for international markets.

**[D] VE Projet Garden Shed**

**Carden Shed – Basic & Deluxe (Lucie Parrot)**

Here is the context of the project:

You are a manufacturer of prefab garden sheds (built in a plant and

shipped and assembled at the client's home) and many clients come to

you to discuss how to modify a garden shed to make it a "pool house".

The project is to come up with a pool house for middle class families:

identify the needs it will fulfill, find a solution, calculate costs

and select a scenario with the best value.

Conceptual design is expected (not detailed engineering design) for

construction of the shell and interior design.

The basic model comprises essentials, i.e., walls, roof and door. Aim is economy.

Deluxe model incorporates desirable features like window, better finish, floor and

maybe with change booth, awning and flower box. Might be used for

poolside installation.

**[E] VE Project Suggested by Joe Slanik, ing., Consulting Engineer**

**Snow & Ice-Free Sidewalk (Paul Zsombor-Murray)**

A project to investigate economic and ecological feasibility of self-deicing sidewalks in a Montreal-like climate. Consider all available sources of heating &/or snow/ice repelling physical processes.

• Residual heat from office buildings; Métro.

• Geothermal heat from wells.

• Electrical energy.

• Solar energy.

• Investigate the optimum materials for sidewalk:

• Grade of cement.

• Grade of aggregate.

• Investigate fins to improve heat transfer.

• Investigate slab structure and cost.

• Servicing and repair

• Heat supply and modular connectivity.

• Compare to cost of snow clearing, salting and labour.

• Reduction of CO2 emission.

• Reduction of the injuries due to falls.

• Modular panels for easy replacement.

• Investigate locations where heated sidewalks are installed.

1. Investigation must not be limited to supplying heat to cause melting/sublimation.
2. To start you off:- https://en.wikipedia.org/wiki/Snowmelt\_system