MECHANICAL ENGINEERING STUDENT DESIGN PROJECT PROPOSAL
(Please return to Mechanical Engineering Department by August 13, 2010)

(i) Title: Backfilling Car Drive System

(ii) Background Information (Problem Description): Jet Boring is the mining method used at the Cameco Cigar Lake Mine in Northern Saskatchewan. The Jet Boring System (JBS) is a semi-mobile mining machine which uses a high pressure water jet to extract uranium ore. The JBS runs along rails within a cross cut developed below the ore body. The JBS drills a pilot hole 50m up from the cross cut into the orebody and jets out the cavities creating an ore slurry which is piped to downstream processing equipment.

Backfilling is an important component in the completion of the cavity (created by jetting). Concrete is pumped inside the cavity by means of backfill casing which runs within the production casing and is secured at the collar hole. Backfilling performs two important functions: providing long term stability of the mined out ore body and ensuring full ore recovery by allowing the jet to mine around the backfill of an adjacent cavity. A backfilling car will be used for adding/removing backfill casings, deploying/retrieving the post cavity survey tool, and handling the backfilling tools/adaptors. A drive system capable of running on rails as well as rubber tires (for movement from cross cut to cross cut) is required for the backfill car.

(iii) Objective(s):

Design a drive system / chassis for the backfilling car. The car must be capable of meeting the following objectives:

- Self propelled under diesel power
- Rubber tires (or alternative) that will allow for relocation from cross cut to cross cut along a rough concrete floor
- Steel wheels (or alternative) that will allow the backfill car to move along the rails within the cross cut
- Capable of transferring from the rough concrete floor onto the elevated (approx. 0.5m) rails
- Can be disassembled into components small enough to accommodate shaft clearances for conveyance underground

(iv) Designed Output:

The backfilling car drive system design output should provide the following deliverables:

- Interim stake holder review drawings / sketches throughout the design process
- Final design report
- Fabrication drawings
- Bill of materials including vendor part numbers
- Cost estimate

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