

**U of T MIE – Mechanical Engineering Project Proposal – Masters Program Student academic assignment**

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Name of Sponsor	OPG (Shawn Fernandes, Sr. Mgr.)/UNENE (Allan Lew, alt.)	
	Ontario Power Generation 889 Brock Road Pickering, ON. L1W 3J2	
Sponsor Primary Project Contact	Phone: 905-439-4958 E-mail: <a href="mailto:shawn.fernandes@opg.com">shawn.fernandes@opg.com</a> ; allan.lew@unene.ca	
Methods for Communication	<input checked="" type="checkbox"/>	In-person Meetings (possible, but infrequent)
	<input checked="" type="checkbox"/>	Online communication tool (e.g. MS Teams, Zoom)
	<input checked="" type="checkbox"/>	Telephone - Contact#: as above; technical spoc & ph# to be provided.
How Quickly A Response can be Expected	_____ hours ____ <b>1</b> ____ days (1 Day acknowledgement; actual delivery of response/info may take longer.)	
Preferred Method of Online Documents Sharing	<b>MS-TEAMS</b>	
Desired Meeting Frequency with MIE Project Team/Assignee	<b>Monthly</b> Status & Progress Check-ins. Or at any Major Project milestone points, as jointly agreed.	

Title of Project
<b>Retrieval of Resin Liners from in-ground nuclear waste storage structures.</b>

## Brief Project Description

### Description of Issue/Problem

OPG processes resin waste at its Western Waste Storage Facility. OPG NSS-W facility will need a method and tooling to retrieve resin liners from the bottom of the IC18 inground structures. These storage tubes are about 40 feet into the ground. Need a way to hook up the crane to the lifting point (ring or lug) on each resin liner, all the way down to the bottom of the IC18. This would be an excellent student project to pursue for a conceptual design solution; and potential detailed design and development of a prototype tool or device.

### Benefits to Nuclear Decommissioning and Waste Management Areas

1. Reduce worker C-14 radiation hazards
2. Prevent individual physically going down into the IC18 confined space
3. Prevent fall and mechanical hazards
4. Save manpower and cost to build scaffolding
5. Improve work task timeline and schedule
6. Reduce safe working plan activities

## Project Details

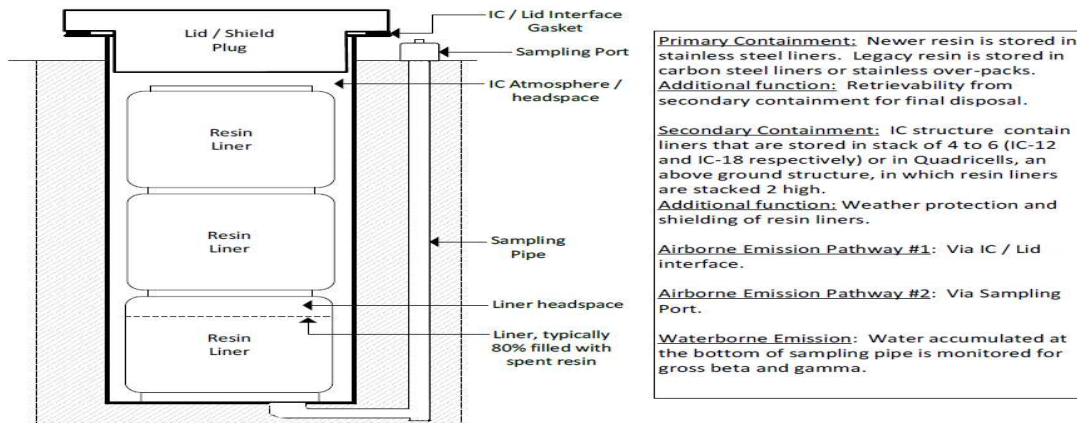
### Detail Notes:

There are six resin liners stacked inside of the IC18, see the attached IC schematic (shown below in Fig.2) for reference. A lifting lug (shown further below) on the top of the resin liner is used for loading the liner into the IC18 or lifting it from the IC18 for resin processing by Crane lifting slings. The lifting lug home position is automatically in "down" position after the liner is positioned inside of IC18. A resin liner retrieval tool or solution is required for lifting the lug into "up" position, and also the crane lifting sling must be threaded through the lug in order to lift each liner up and out. Otherwise, one individual must go down into the IC18 each time, physically lift the lug and put the crane sling into it for crane lifting. Currently, the lifting crane can only reach the 2<sup>nd</sup> resin liner by building scaffolding down into IC18. The last four resin liners beneath are not reachable.

Reference:

1. IC-18 lifting lugs, 01098-CALC-79133-00001 (OPG Proprietary)

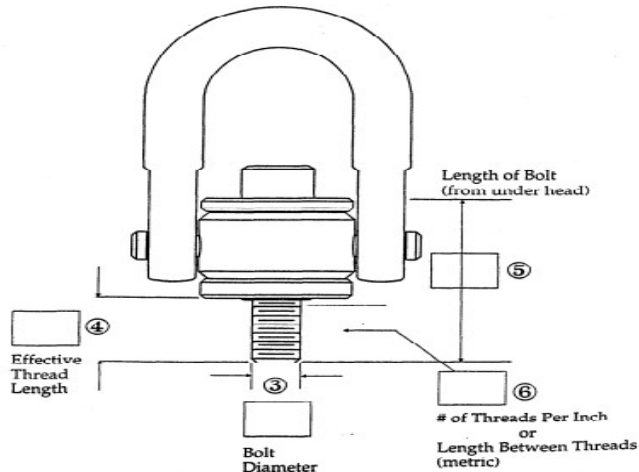
Figure 2: IC Schematic



- ① Determine the *Type of Threads* required on the Hoist Ring - Metric or UNC, UNF, Etc. (NOTE - NOT DESIGNED FOR PIPE, ACME OR TAPERED THREADS)
- ② Determine the *Working Load Limit* of the requested Hoist Ring.
- ③ Determine *Bolt Diameter* - The diameter of the required bolt.
- ④ Determine *Effective Thread Length* - This is the length the threads must be in order to fully engage, or project through, the work piece. NOTE: If the Effective Thread Length is not known, the Length of Bolt is required.
- ⑤ Determine *Length of the Bolt* - The overall length of the bolt as measured from under the head of the bolt. NOTE: If the Effective Thread Length is not known, the Length of the bolt is required.
- ⑥ # of Threads per Inch (Length Between Threads for Metric threads) - This information is required to ensure we ship proper bolt size (i.e., 1/2 - 13, 7/8 - 9, 8 x 1.25, etc.)

① Thread Type (Circle One)  
U.N.C. Thread Metric Thread Other \_\_\_\_\_  
(NOT DESIGNED FOR PIPE, ACME, OR TAPERED THREADS)

② Hoist Ring Capacity (Working Load Limit) \_\_\_\_\_ lbs.  
\_\_\_\_\_ Kgs.





Top aerial view of Resin liner canisters stacked in the IC18 Storage Structure:

Note, Two different sample IC18 resin liner canisters with the lifting lug in the normal down position.

### Desired Project Deliverables

1. Conceptual design solution document and preliminary design drawing(s)
2. Detailed design description, detailed drawings and specifications; any stress or loading analysis as required, and materials list needed for fabrication. The recommended maintenance plan and spare parts list for the fabricated solution.
3. Estimated cost breakdown to fabricate/produce the design solution or prototype tool/device/apparatus.

### Sponsor Resources Available to Project Team

- access to sponsor's technical and engineering staff for consultation
- IC18 structure and container/liner drawings;( under supervised controls or NDA & return of docs.)
- one initial on-site visit to waste storage facility for field & equipment viewing and pre-design familiarization and verifications; or alternately in lieu of, supplied photos or video of field conditions, involved equipment, clearances and layout, in-situ craning equipment and ancillaries, etc. as identified by MIE project student and advisor.
- subsequent field visit(s), only as agreed/approved by OPG.
- sponsor's tooling design standard and requirements, if available.