



LATTICE SLEEVE HANDLING TOOL  
PROMATION / AECL CANADA



Case Study 1

Description: During removal series for refurbishing AECL CANDU 6, LSHT was one of the automated tools that got mounted on the platform in front of the reactor face. LSHT facilitated insertion of different tools through few series to help with removing Pressure Tube and Calandria Tube. LSHT had 7 axes in total. Two long axes in Z direction called Upper and Bottom axes for inserting and removing tools. Two rotary Grippers, one for each Z axis for gripping the tools. Three vertical axes in Front, Middle, and Back of the tool for moving tool up and down synchronously or tilting the tool forward and backward by moving axis separately.



## Hardware & Software

- ✓ Siemens S7-315F series with Safety
- ✓ Sinamics S120 for driving 7 axes servo motors
- ✓ S7-300 Technology CPU for synchronizing 3 vertical axes
- ✓ Operator Pendant for controlling the tool and running different sequences.
- ✓ Siemens WinCC Flexible for programming operator pendant
- ✓ Profinet Communication bus

## Challenges

- ✓ Customer had planned for two long sequence for top and bottom axes which would load a tool, insert the tool into reactor, leave the tool inside the reactor for other operations, then remove the tool, and unload the tool.
- ✓ The issue was the length of each sequence and the number of parameters that operator had to enter for gripping, insertion, removal, and release as the tools didn't have the same length and diameter.

## Solution

- ✓ Created 4 short common sequences that could work for both Top and Bottom axes called: Load, Unload, Insert, Remove
- ✓ Creating a recipe that let the operator to mix any sequence with either Top or Bottom axis and run them back to back or pause in between such as:
  - ✓ Load Top (Loading a tool on the Top axis)
  - ✓ Remove Bottom (Tool moving forward into reactor, grip on a tool on the face, removing it)
  - ✓ Insert Top (Moving forward and insert the tool into reactor)
  - ✓ Unload Bottom (Unload the tool which is sitting on the bottom axis)
- ✓ Creating another recipe with 20 parameters for each tool to help with movement of axes in Z direction, Gripping, and Vertical movement.

## Achievements

Customer had planned to use LSHT for two tools only but after the ease in parameterizing the recipe and programming the sequences, customer was able to use LSHT for handling 16 different tools.



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