

# System for Single Tile Production

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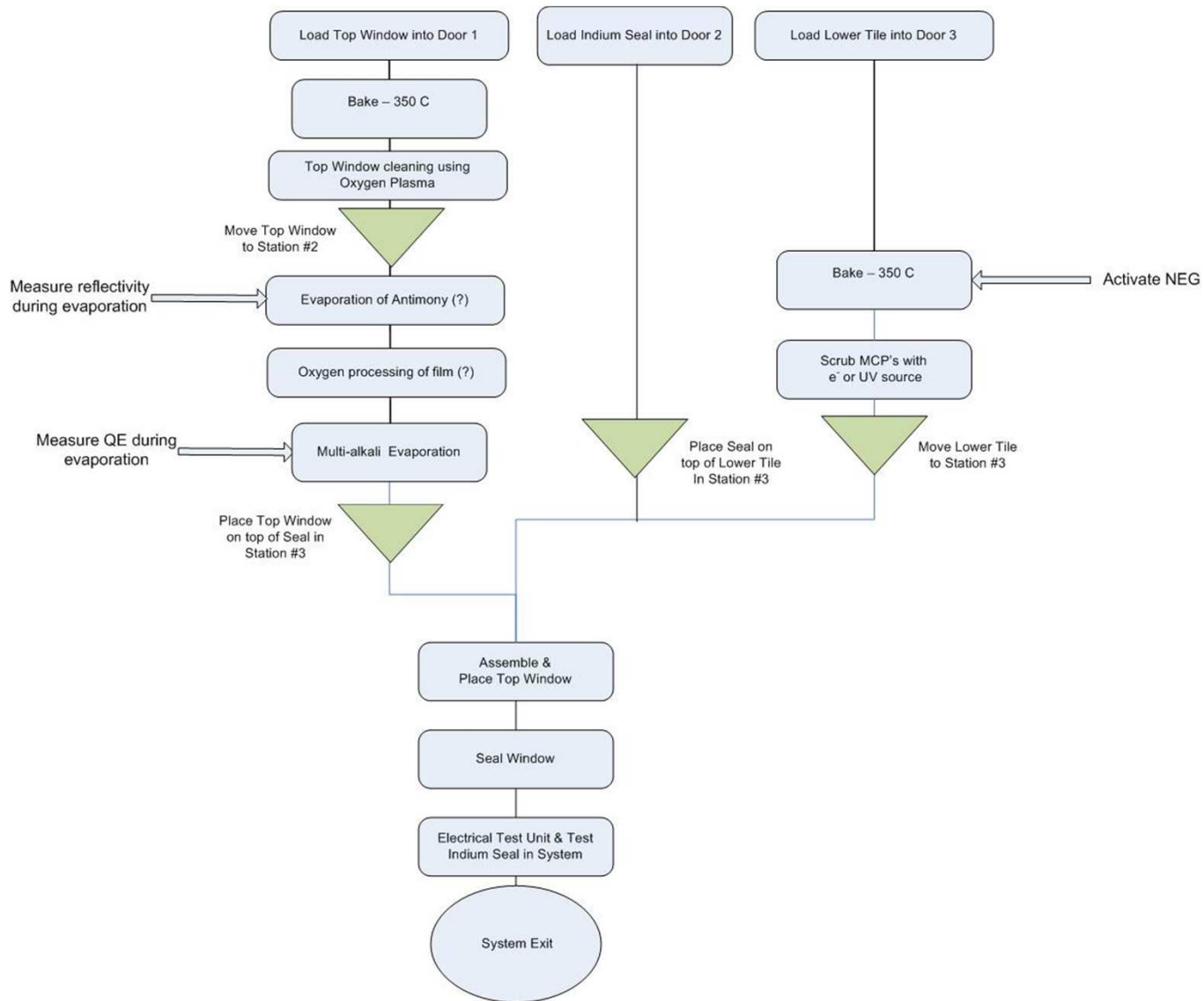
Robert Wagner

Argonne National Laboratory

# Motivation

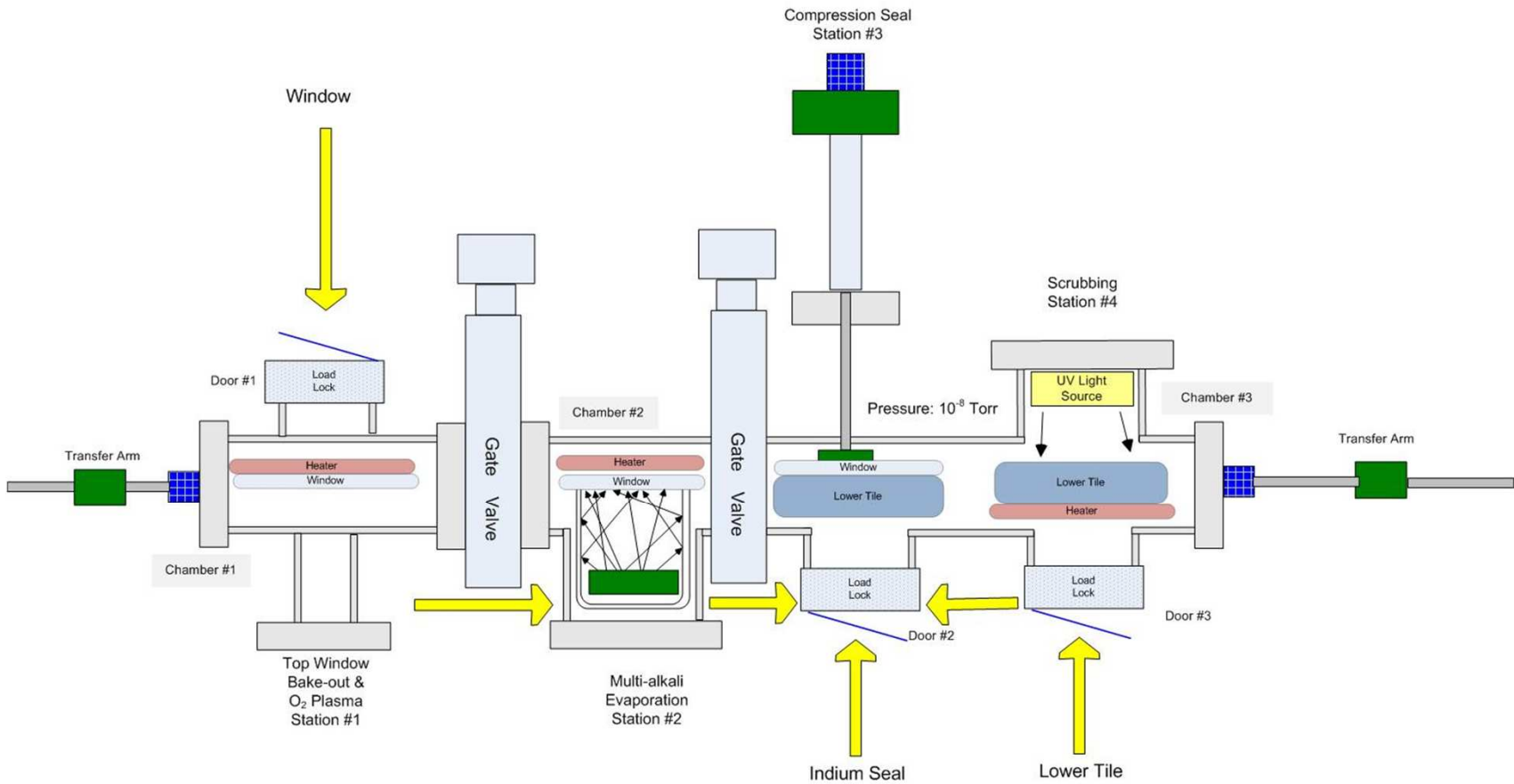
- The full sized vacuum processing system will be an important for the construction of photodetectors tiles in small batches.
- The problem is that a system of this complexity will take considerable time and effort.
- There is a need for a simpler and lower cost system to work out the process steps on full sized parts. Having a simple manual system will provide a facility sooner rather than later as it coming about with the batch system.
- A simple system of this type will process one tile assembly at a time and so its output will be limited.
  - It will provide a base from which the photocathode processing can be worked out.
  - It will be another location for questions about conditioning MCP's can be addressed.
  - It will be the next step in the development of the metallic top seal.
    - In the laboratory the top seal can only be worked on in sizes of 1 inch and 4 inches.

# Material Processing Flow Chart



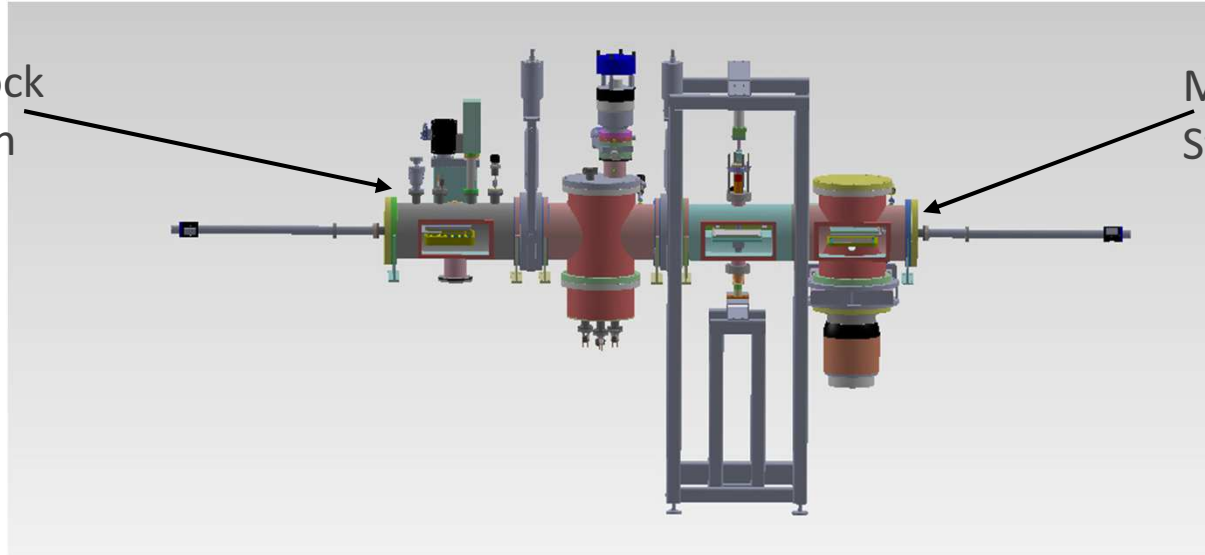
# Simplified Single Tile Production Machine

Single Tile Production Machine



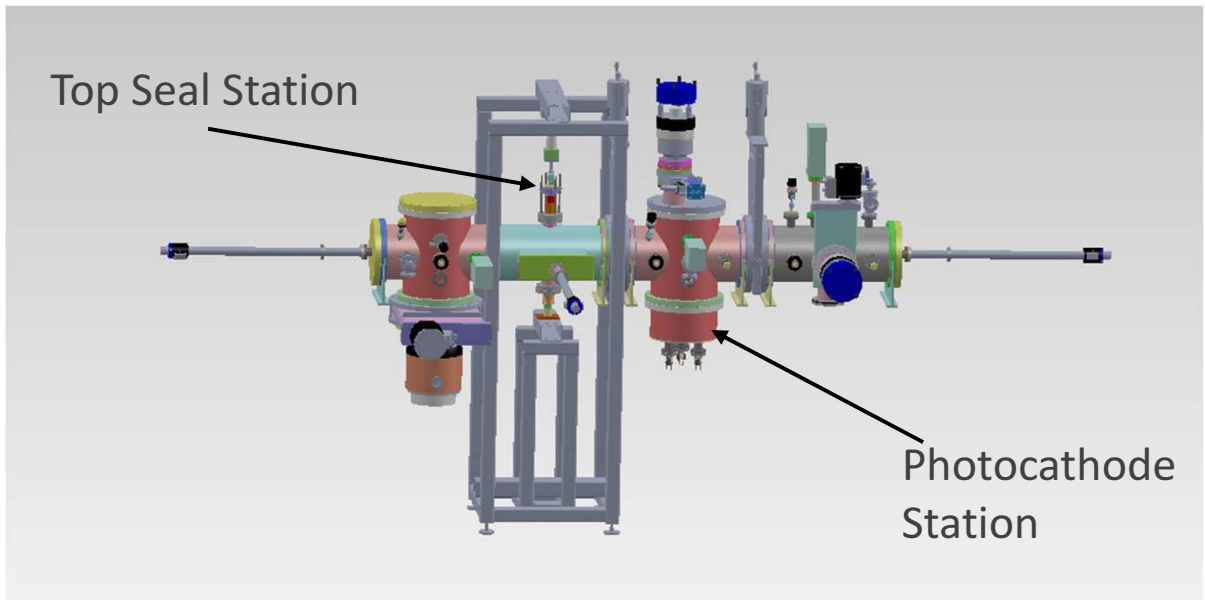
# Conceptual System Design

Entry Load Lock  
Baking Station



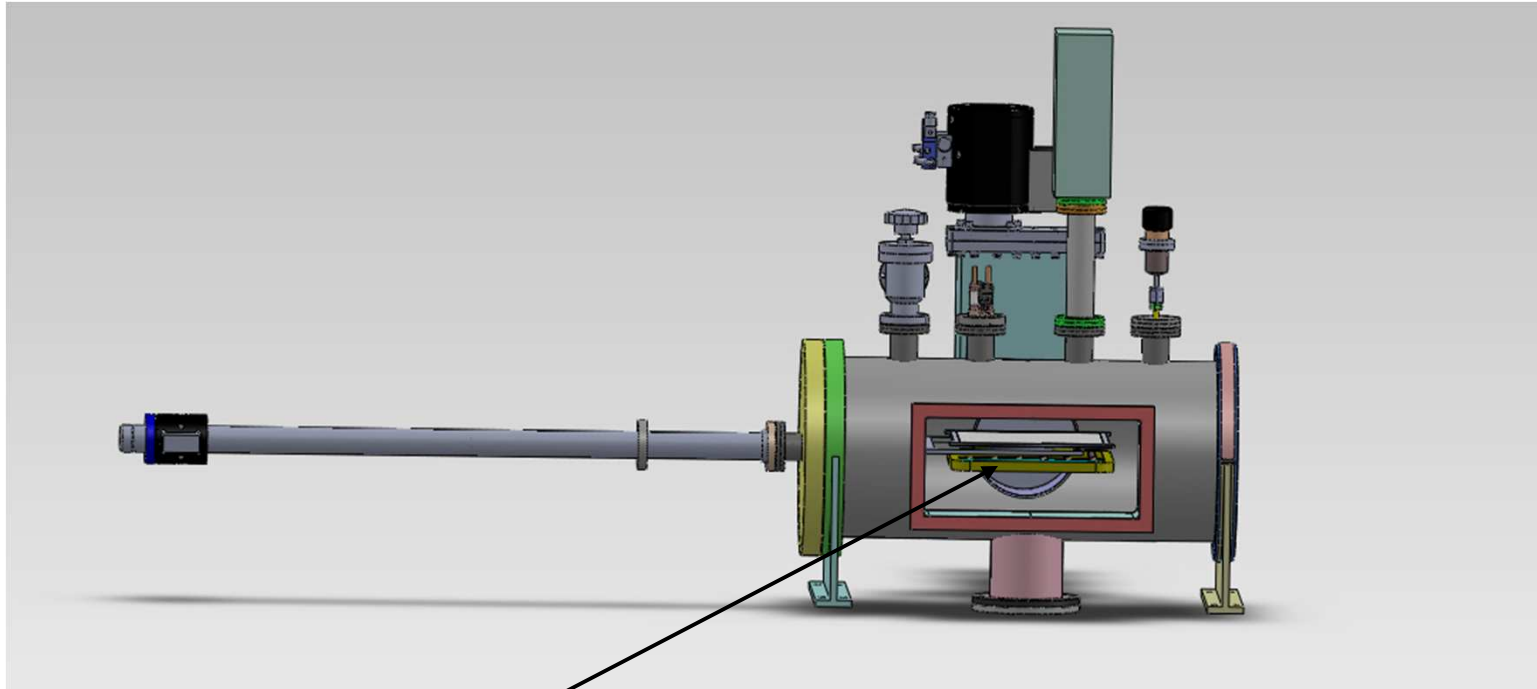
MCP Scrubbing  
Station

Top Seal Station



Photocathode  
Station

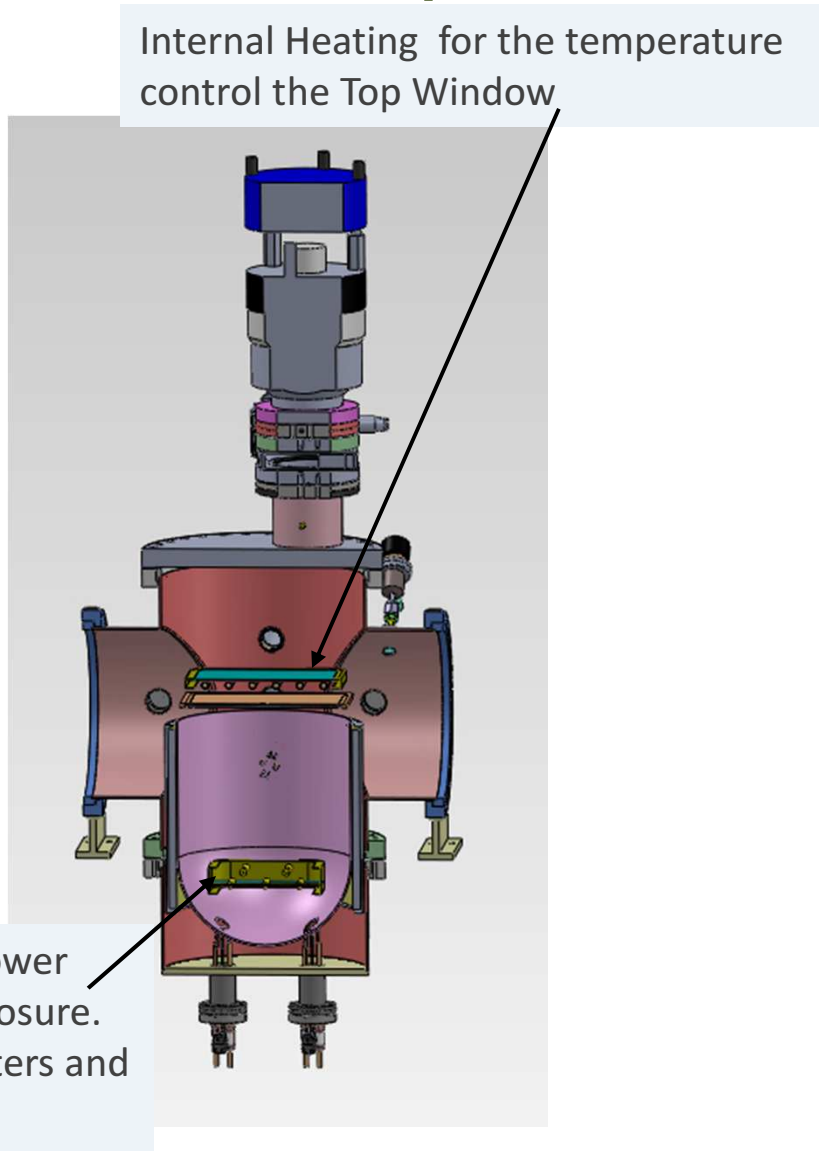
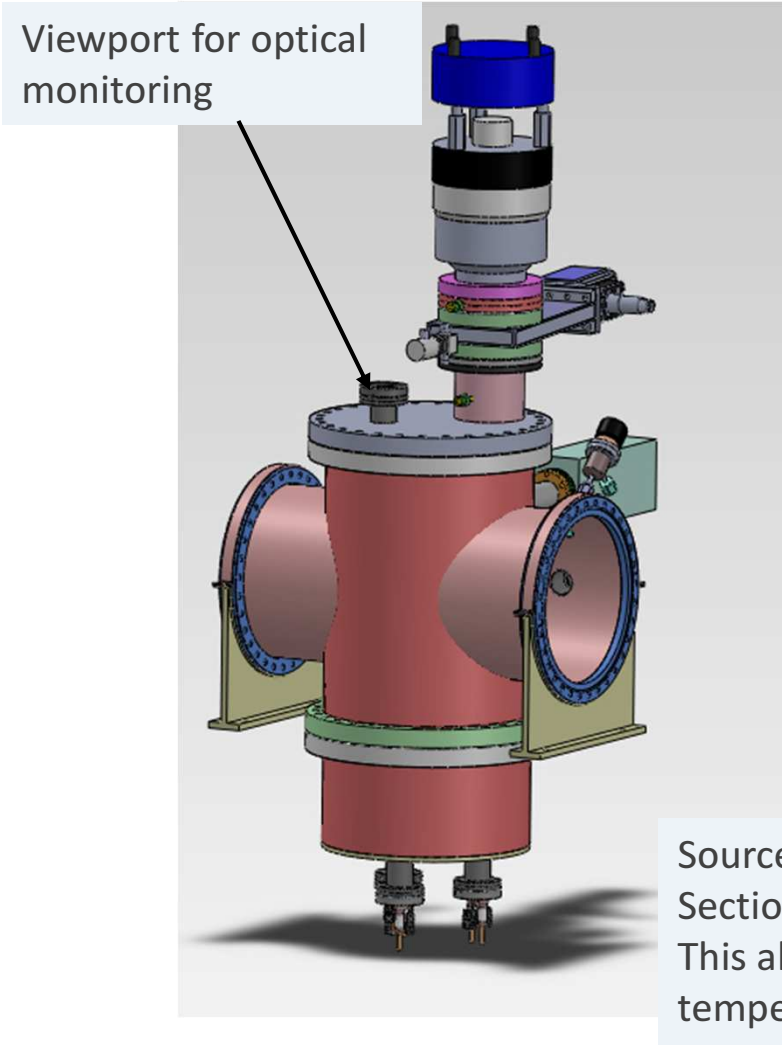
# Chamber #1 - Bake-out and O<sub>2</sub> Plasma Cleaning



Internal Heating for baking the Top Window

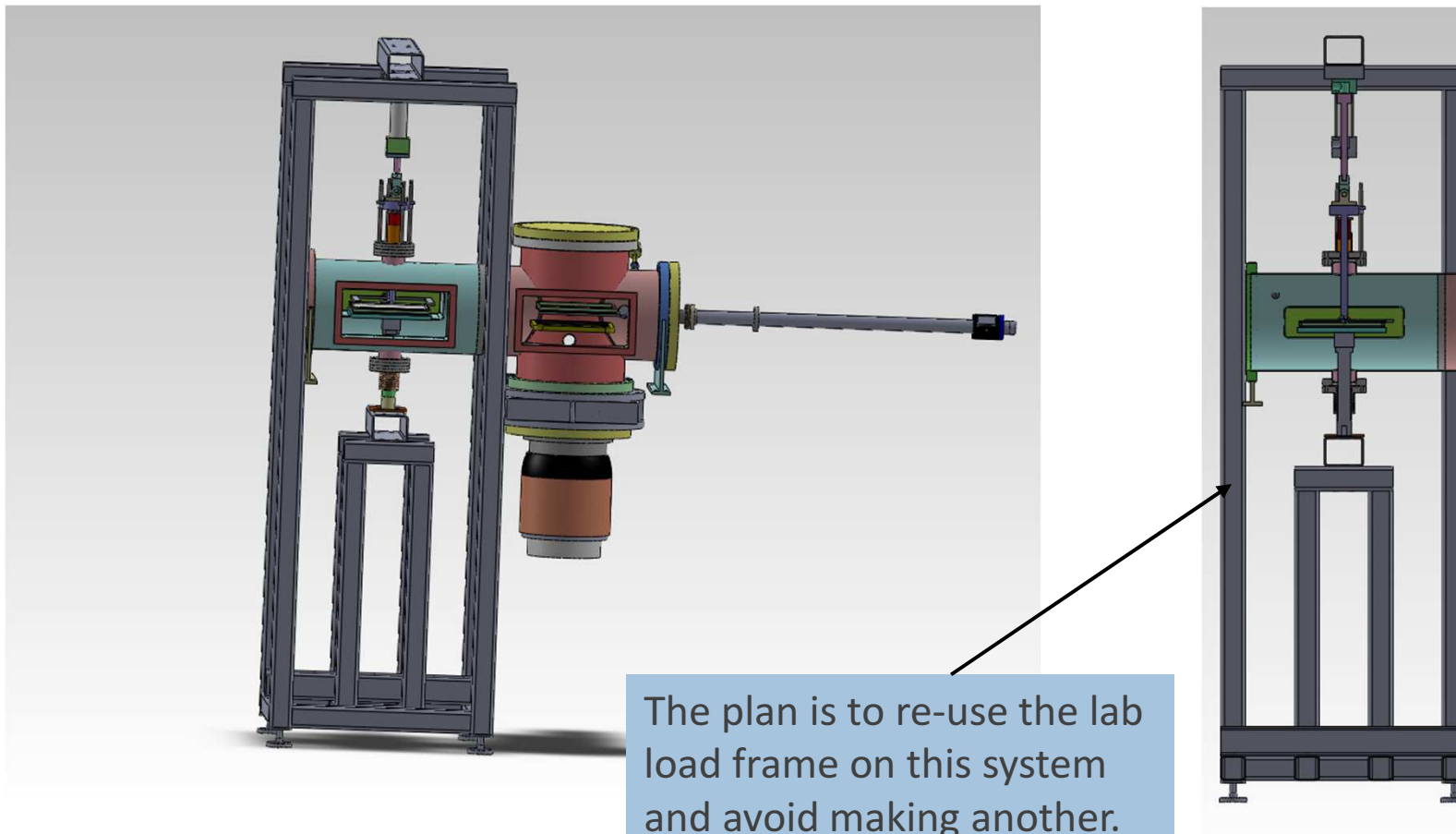
There will also be a provision for O<sub>2</sub> plasma cleaning

# Chamber #2 - Multi-Alkali Photocathode Deposition



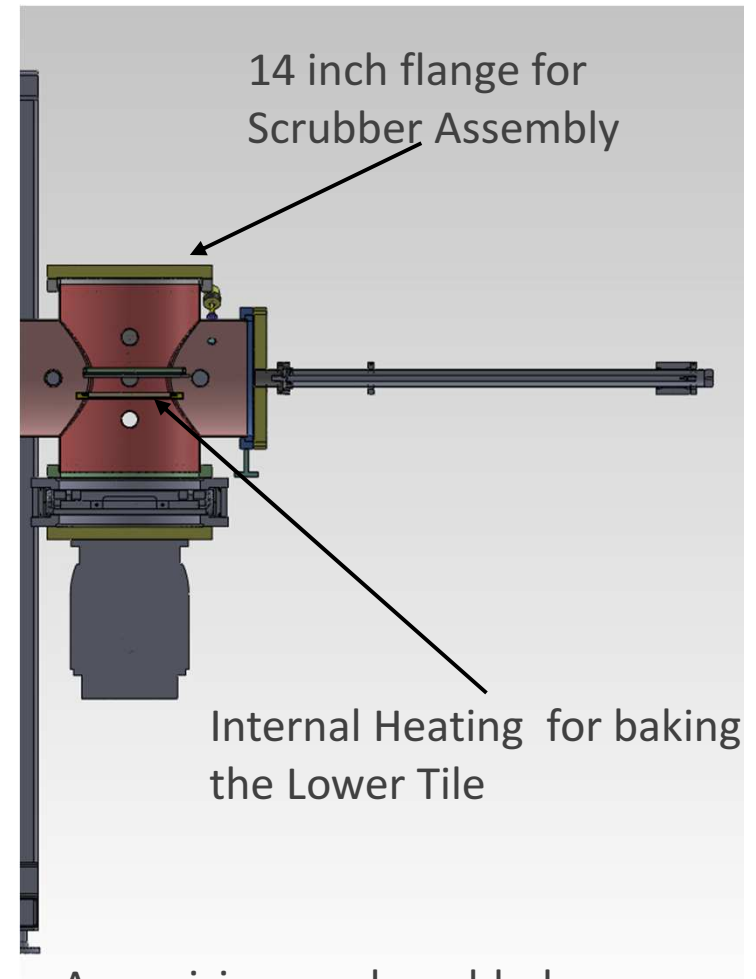
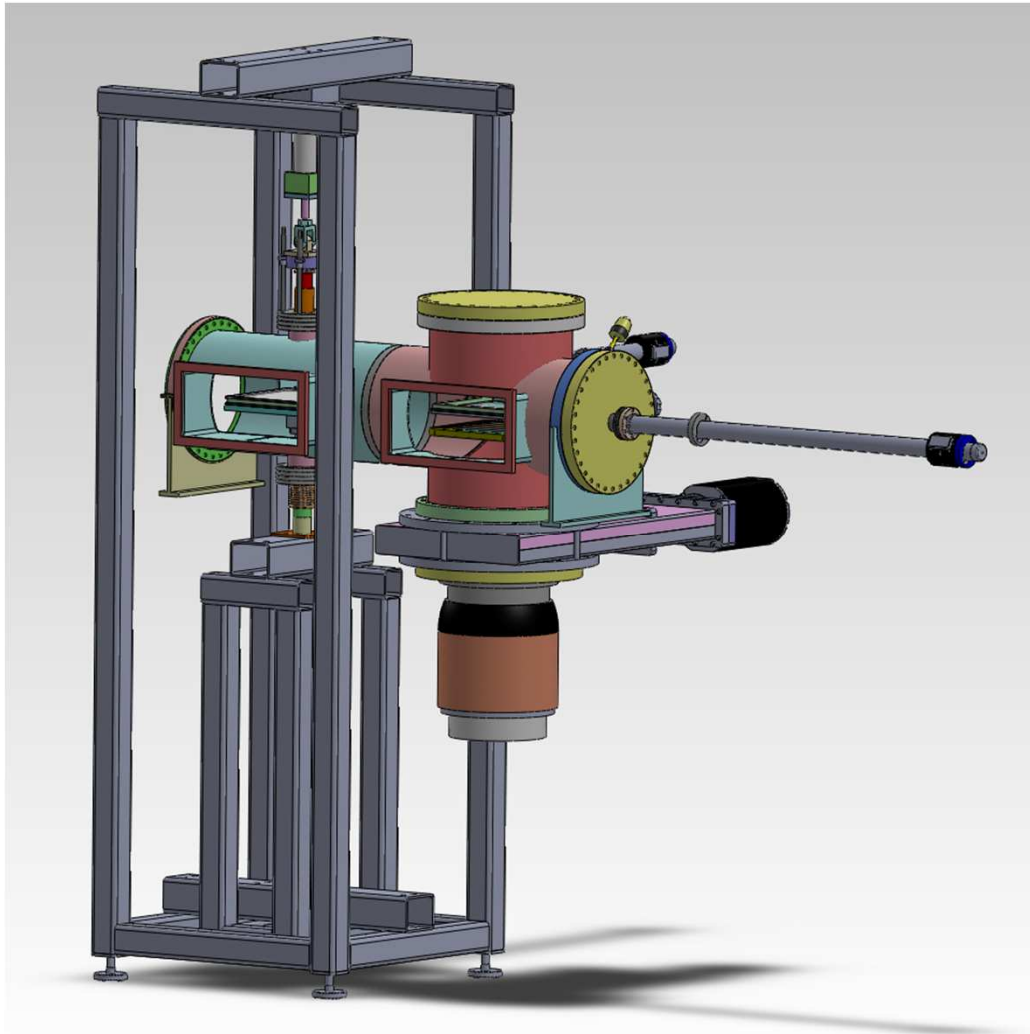
## Chamber #3 - Top Seal

- The hydraulic press that is currently being used in the lab for 1 inch and 4 inch samples will be transferred onto the system. This will be based upon successful seals made with 120 lbs./ linear inch. If that does not come about a new higher strength frame will be required along with a larger hydraulic cylinder.





# Chamber #4 - MCP Baking and Scrubbing

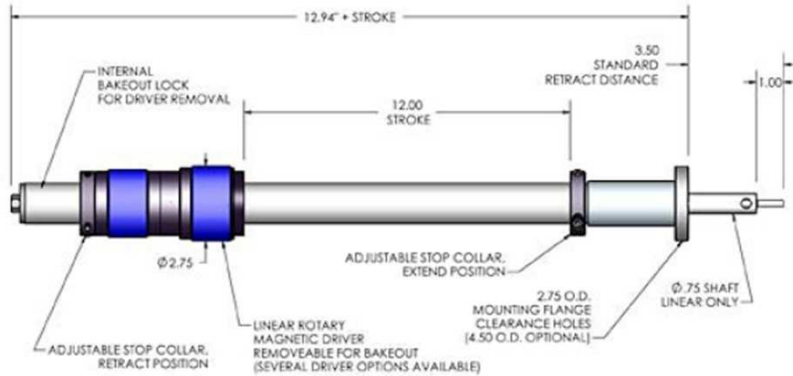


A provision can be added for additional H<sub>2</sub>O pumping by way of a cryo-plate



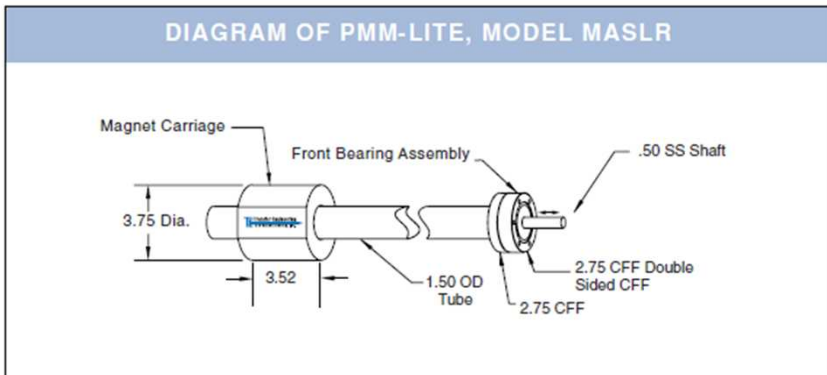
# Transport of Parts in the Vacuum System.

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MCLR-275

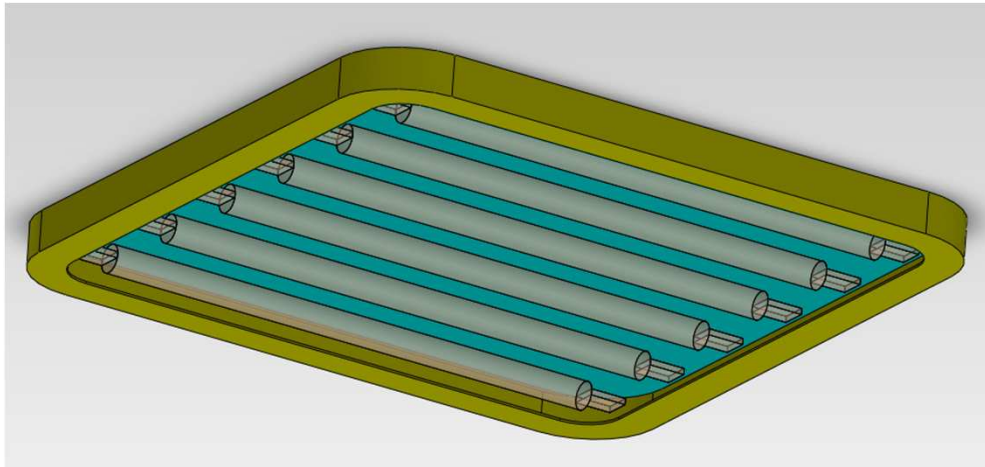
Transfer Engineering



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# Internal Parts Heating



- The conceptual design of the Top Window and Lower Tile heaters is based on the use of quartz halogen heaters inside the vacuum chamber.
- These have been used in other system such as the top seal development system.
- They are also available from commercial suppliers.

Transfer Engineering



# Vacuum Pumping

- Turbo pumps
  - Large 1600 pump (Scrubbing station)
    - Pump is in house
    - Power supply and cable will need to be purchased.
  - Small turbo pump (Photocathode deposition)
    - Pump is in house
    - Power supply is in house
    - Will need to purchase main cable
  - Medium Turbo pump
    - Will contact CNM about used pumps
- Ion pump (Top Seal)
  - Pump is in house
  - Power supply is in house
  - Cable is in house.
  - Not sure how to monitor this
- Cryopump
  - There are unused pumps within APS that might be available.
  - Otherwise a cryo-plate will be sufficient to add additional H<sub>2</sub>O pumping speed.



# Status of Design

- System conceptual design is being carried out by Dean Walters.
  - Details are being worked out with the Collaboration with Bob Wagner, Jun Xie, Zirki Yusof, Marc Kupfer, Sasha Paramonov, Matt Virgo, and Henry Frisch.
- Bob Wagner and Zirki Yusof are concentrating on the general design of the photocathode deposition station.
- A group will need to be formed for the MCP scrubbing station.
- Marc Kupfer and Dean Walters will concentrate on any design modifications that will be required in the Top Seal station.
- Ron Kmak will be working on the system support frame.
- The drawings for the vacuum chambers have been started by Ron Kmak. He will be generating drawings in sufficient detail so that request for quotes can be sent out in the first week of January 2012.



# Status of Parts Procurement

- Two categories of parts were identified as long lead.
  - System Gate Valves
  - Transfer Arms
- A quotation for the gate valves has been received .
  - A request for purchasing the parts has been made.
- Transfer Arms
  - A description of the function of the transfer arms is being made and will be sent to vendors by December 12, 2011.
  - The vendors will be able to quote the transfer arms from the description.
  - The plan is to have the quotes before the holiday break and request purchasing the parts in the first week of January 2012.
- Other Parts
  - Vacuum gauging
    - A request for quote on this has been completed
  - Gas Analyzer
    - The quote for this has been received and a request for a requisition has been made.



# Size Comparison

