

# Single Tile System Design Requirements

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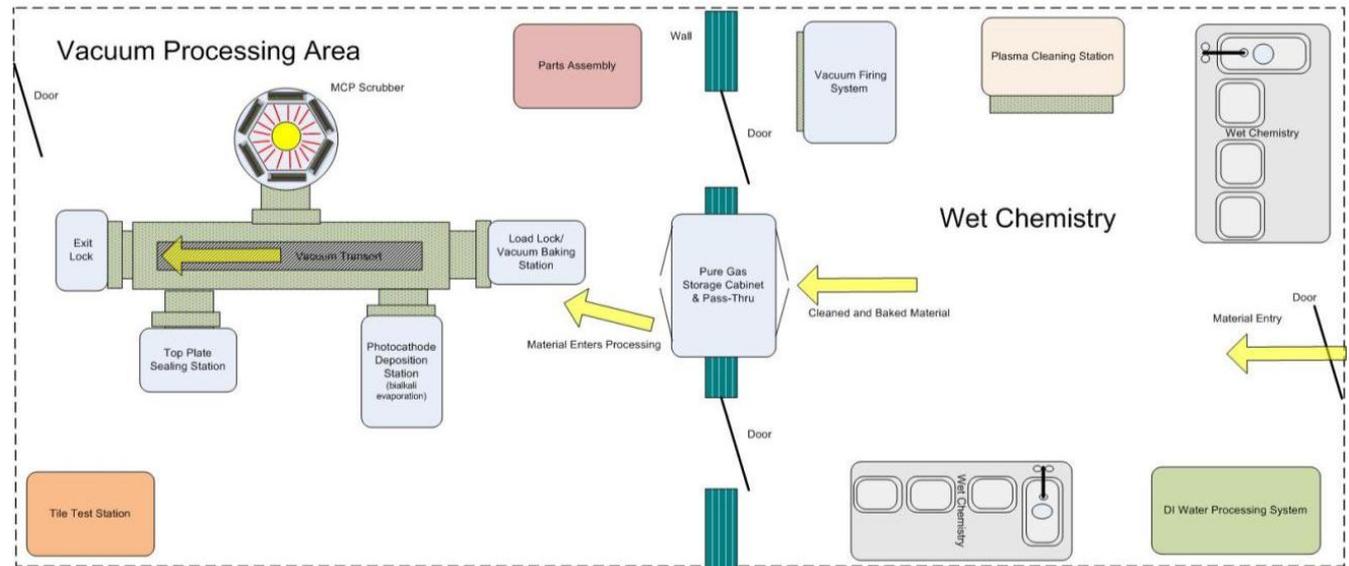
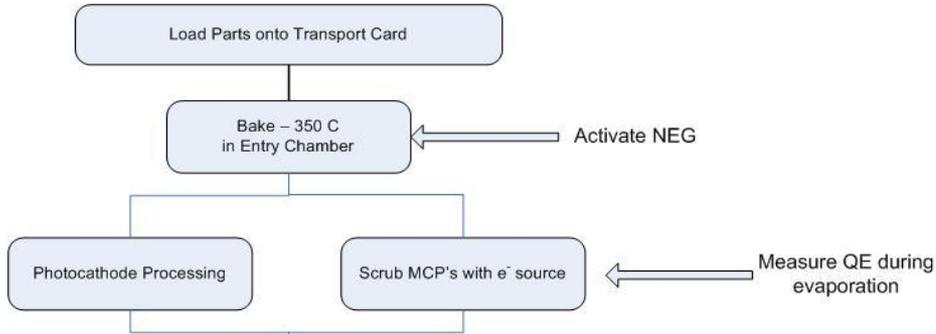
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# Outline

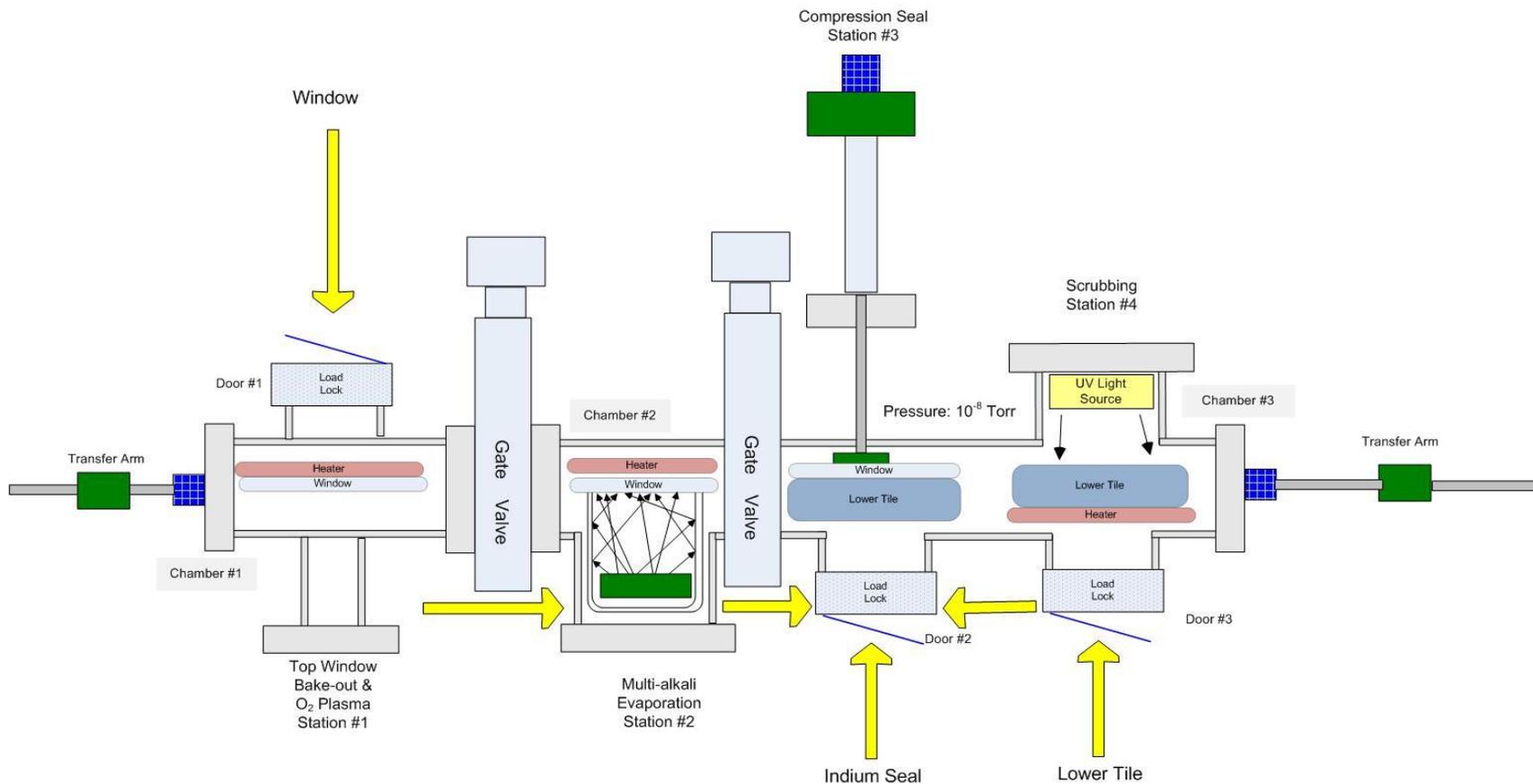
1. Single Tile Process System (STPS) Processes
2. Schematic of system
3. A Little History
4. Design intent
5. System Flexibility
6. Design Requirements & Constraints
7. System Risks

# 1. STPS Processes



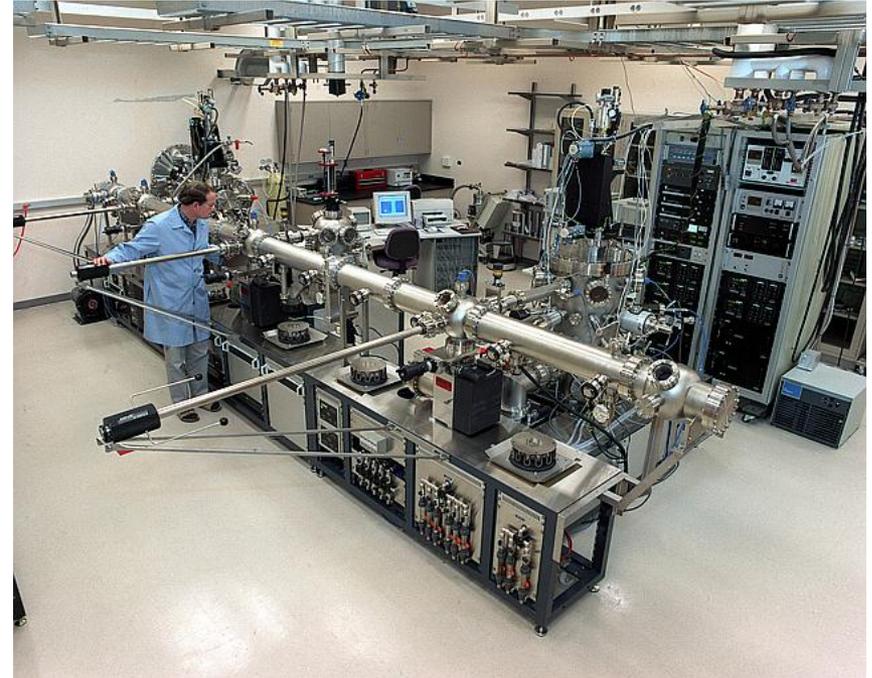
## 2. Schematic of the STPS

Single Tile Production Machine

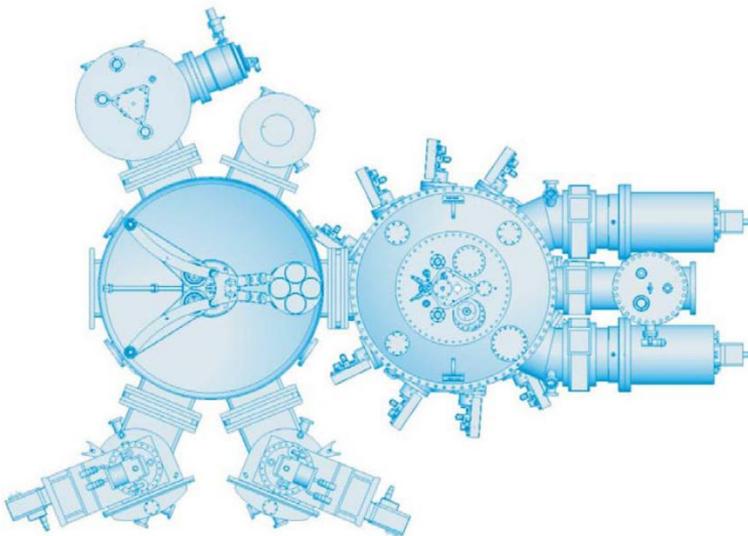


# Substations within STPS

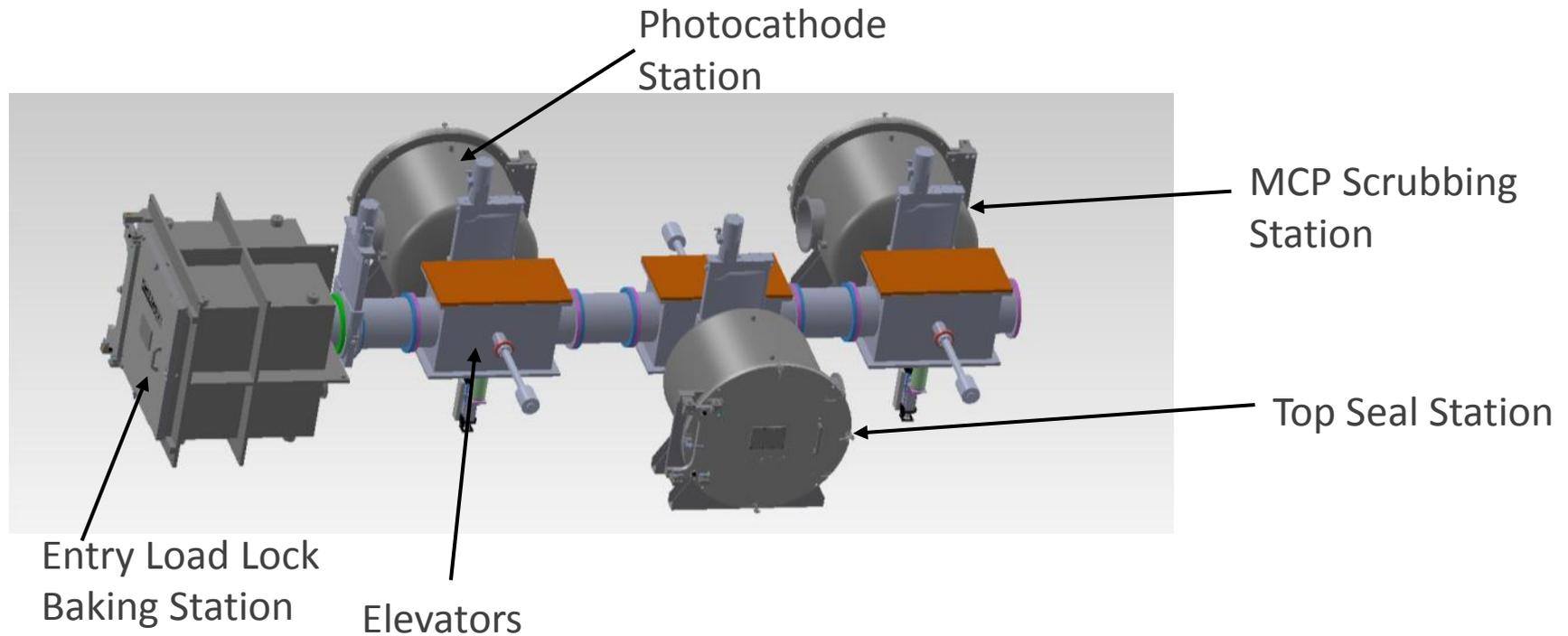
Linear Tool



Cluster tool



### 3. History



Six months ago a larger system was envisioned. This was a system that could produce 6 tiles per week. This system goes beyond the present funding and manpower that is available within the LAPD project.

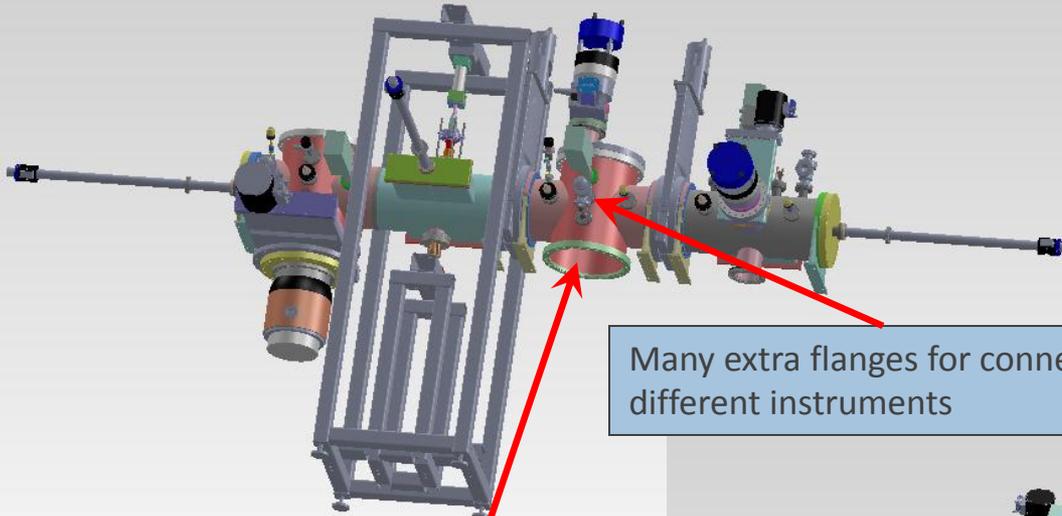
# 4. Design Intent

## New system concept

- The STPS was originally conceived to be a system that allows reaching the goal of making a single sealed tile assembly before the end of the fiscal year in September 30, 2012.
- This system will produce one tile assembly at a time, cycle time will not be the focus at this point but will be optimized in later systems or upgrades of this system.
- The STPS was conceived to be designed and constructed in a minimum of time. It also is intended to be very inexpensive compared to the large system.
- Subsystems design will use standard components whenever possible.
  - System flanges will be conflat for base pressure and temperature reasons.
  - Re-use the Thermocompression substation
- The STPS is the means to work out initial processes that could be later taken to the later systems for use in a small batch production environment.
- The STPS is conceptualized to make certain technical concessions to speed up its construction.
- The STPS has only a single load lock for the top window and so all the other parts of the system are brought to air with every run.



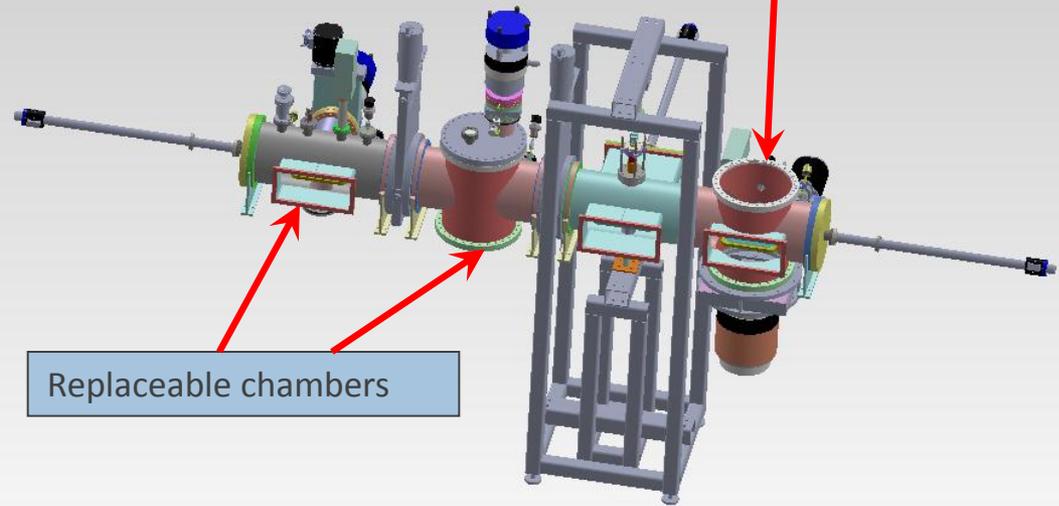
# 5. System Flexibility



Port for scrubbing station  
A 14 inch tube with 16.5 inch CFF  
can be used to attach many  
different scrubber designs.

Many extra flanges for connecting  
different instruments

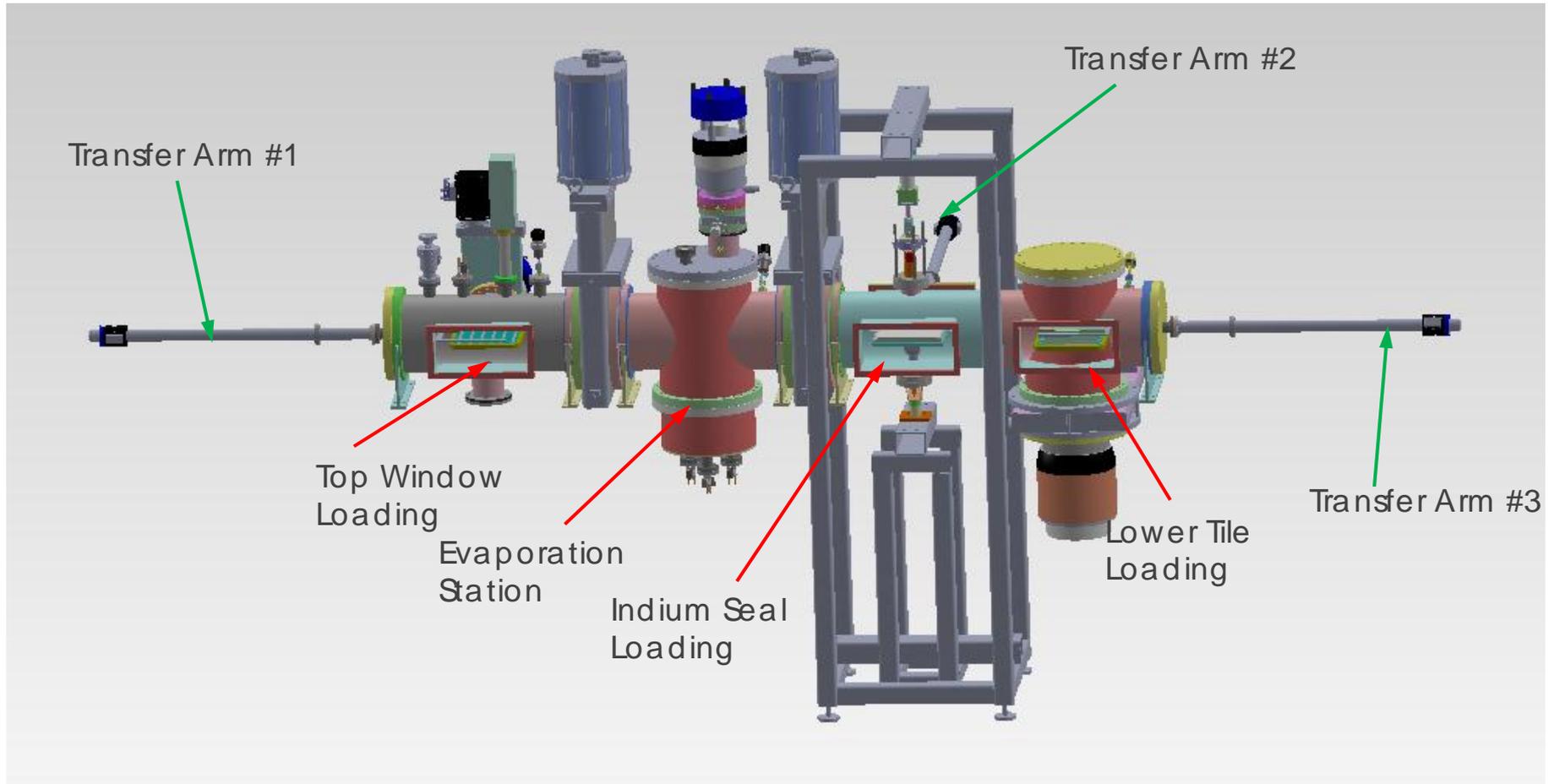
Port for evaporation station  
A 14 inch tube with 16.5 inch  
CFF will allow full field of view.  
There is space for a station  
that is 38 inches long.



Replaceable chambers



# Single Tile System



## 6. Design Requirements & Constraints

- Must be able to handle a part that is 9.02 inches wide.
- Must be able to evenly heat parts up to 400 deg C.
- System capable of pressure  $\sim 10^{-9}$  torr.
- Dry pumping for both the rough and the high vacuum pumps.
- Rough pumping (and venting) should have the facility to control the pump rate to mitigate the spreading of dust onto the top window and the MCP's.
- All handling will be done in vacuum.
- Must have enough viewports to be able to see parts during parts transfer.
- Must be able to isolate scrubbing from photocathode processes.
- Must be able to keep the alkali sources under vacuum all the time.
- Must be able to monitor top window during photocathode process
  - Must be able to electrically connect to the top window electrode.
  - Must be able to perform reflection test.
  - Must be able to perform a QE test insitu.
- Must be able to monitor MCP during scrubbing.
  - Must be able to electrically connect to MCP/Anode.

# 7. System Risks

- What is scrubbing?
  - Is an electron or ultraviolet light a better way to scrub?
  - Will scrubbing interfere with the indium sealing process?
- How to make a photocathode on a transfer top plate.
  - Does this system configuration preclude using the experience from the Chalice or will new methods need to be developed.
  - Will the use of oxygen plasma corrode electrical contacts within the processing chamber.
  - Since the windows are so large and the sources can be used multiple times, does the build-up of alkali materials present a safety issue?
- Because of the manual part handling there is the possibility of dropping our parts.
- Placing the indium seal must be done accurately.
- This is a very aggressive build and actual construction may take longer than we think.

# Conclusions

- The STPS is intended to be a simple manually operated system for the building of the first glass body photodetector tile assembly.
- The STPS is designed to make one tile assembly at a time.
- The STPS will be the platform where photocathode and scrubbing processes are developed on full sized parts.
- The design of the STPS will leverage as much commercially available components as possible to control costs and speed up construction.
- The STPS will utilize the existing thermocompression load frame and hydraulics system to avoid making a second assembly.
- The STPS is not without some risks. These risks revolve around the processes being scaled up to full size.