

8 Inch Single Tile Processing System & Schedule

Bob Wagner
for LAPPD2 Collaboration
Hermetic Package Godparent Review
Wednesday 03 April 2013

Objectives of 8 Inch STPS

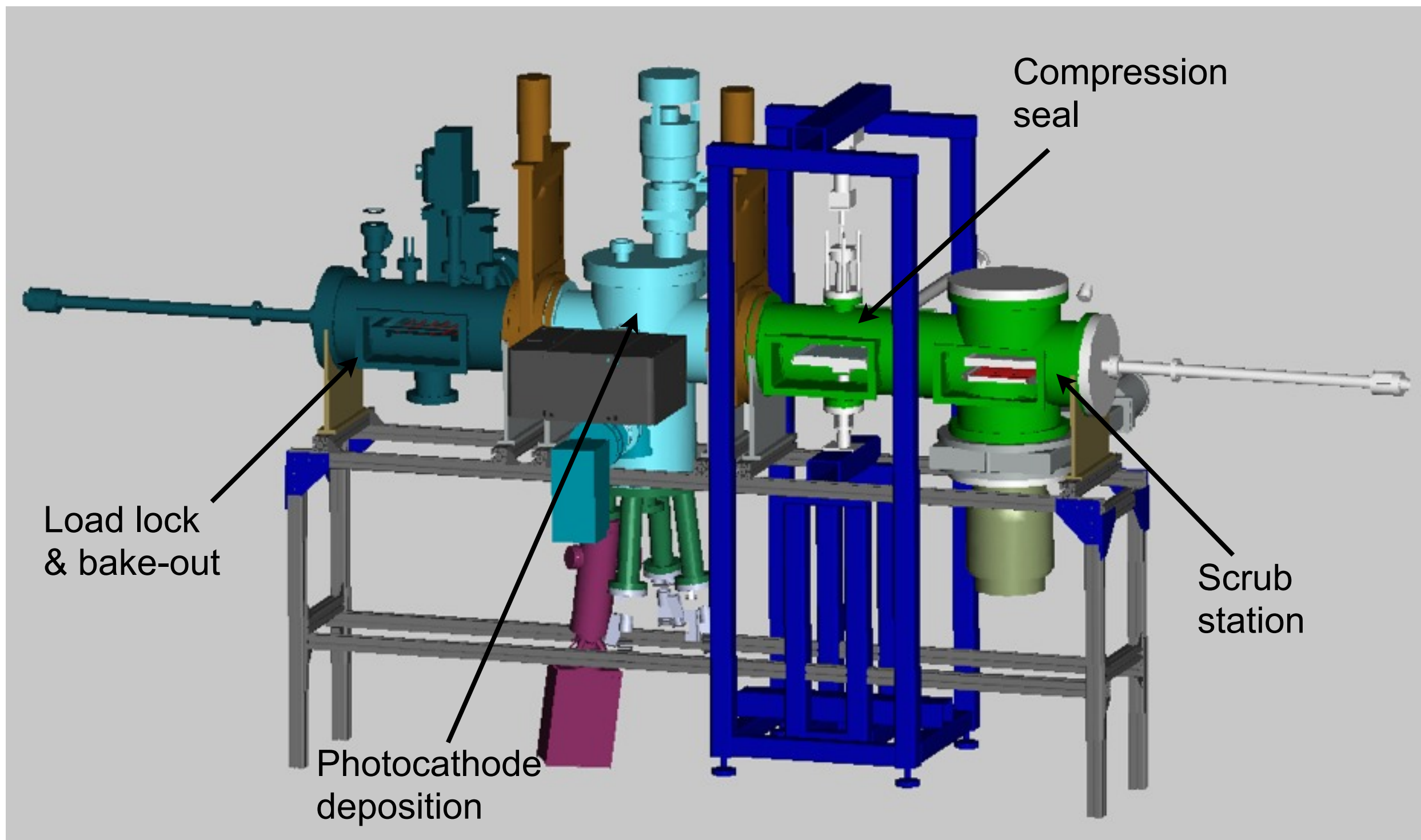
- ▶ Establish photodetector production capability at Argonne
- ▶ Produce 20×20cm² Active Area All-Glass MCP detectors One at a Time
 - Provide detectors for first adopter detector development, e.g.
 - Water Cherenkov neutrino detector
 - Colliding beam TOF
 - Rare K decay photon identification
 - PET imaging
- ▶ Develop process that is commercially scalable and adaptable
- ▶ Platform for LAPPD R&D and in-depth studies of process technology

Simple Overview of Single Tile Production

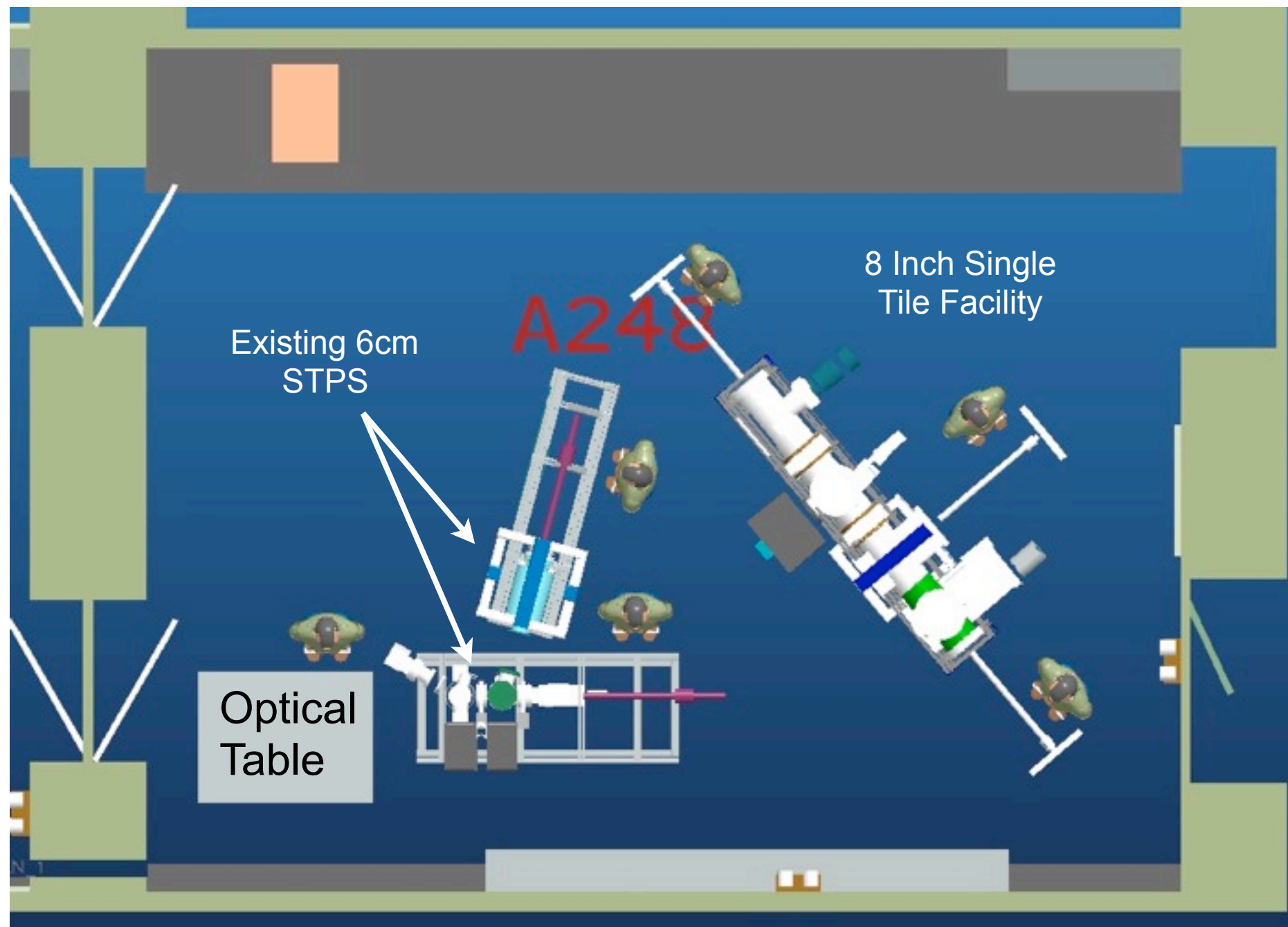
- ▶ Fabricate & clean tile base
- ▶ Load internals
 - MCPs & Grid Spacers
 - Getter assembly
- ▶ Bake Tile Base Assembly & Pre-condition (scrub) MCPs
- ▶ Clean & Metallize top window
- ▶ Photocathode fabrication on top window
- ▶ Prepare & Load Indium wire onto sidewall
- ▶ Press seal of top window onto tile base sidewall
- ▶ Remove finished photodetector from STPS



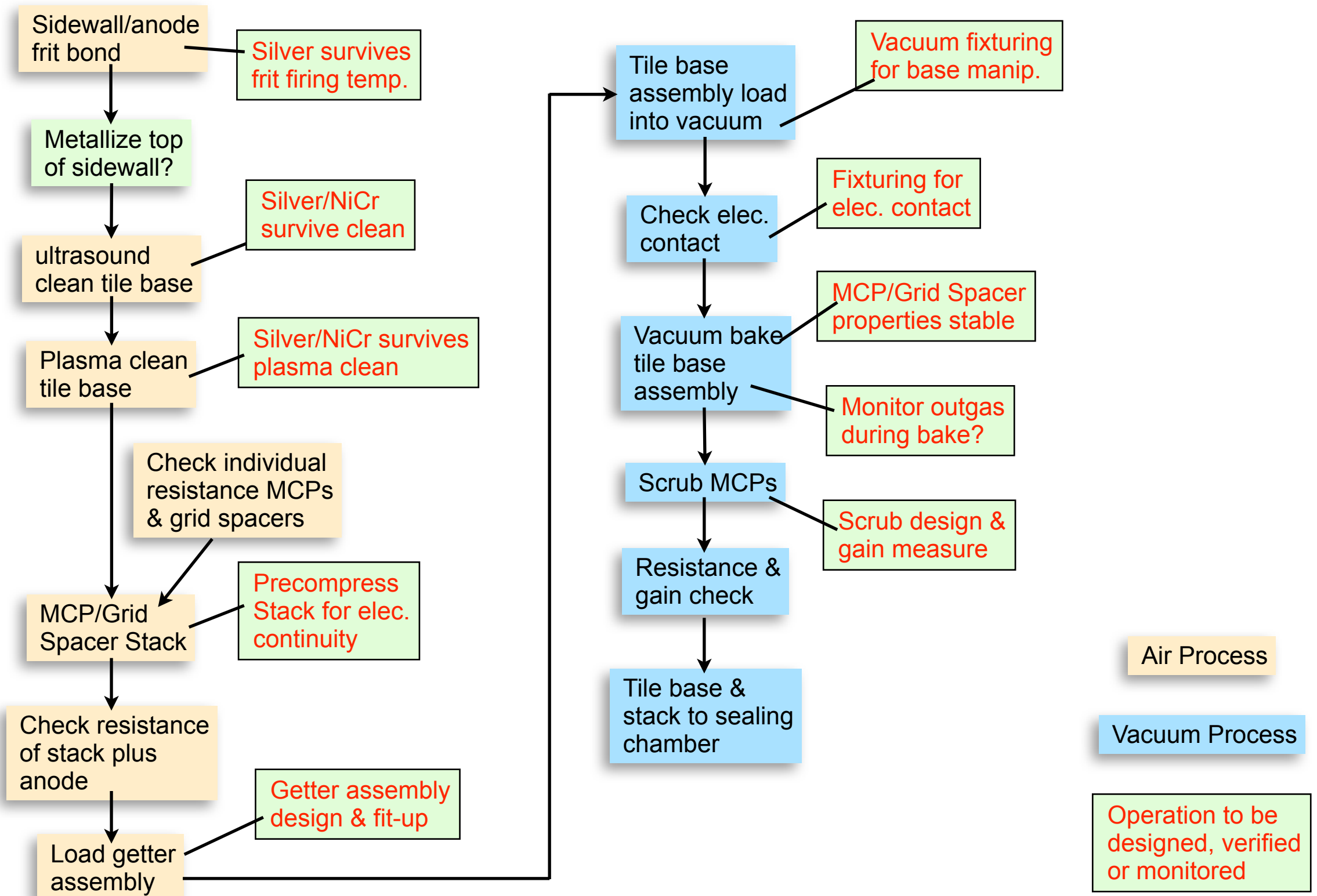
Model of 8 Inch STPS



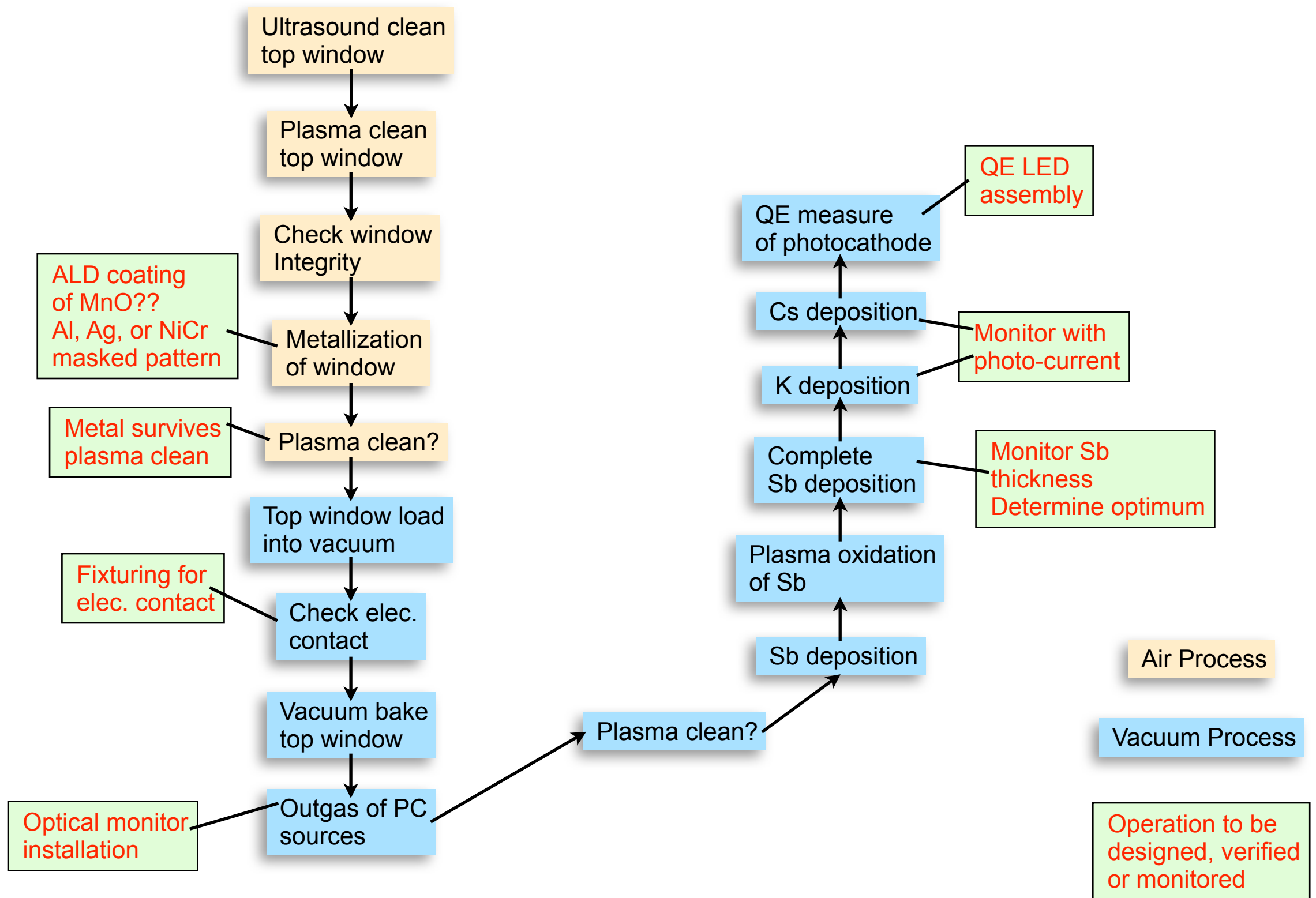
Layout of 6 cm and 8 inch Single Tile Processing System in Tile Production Lab



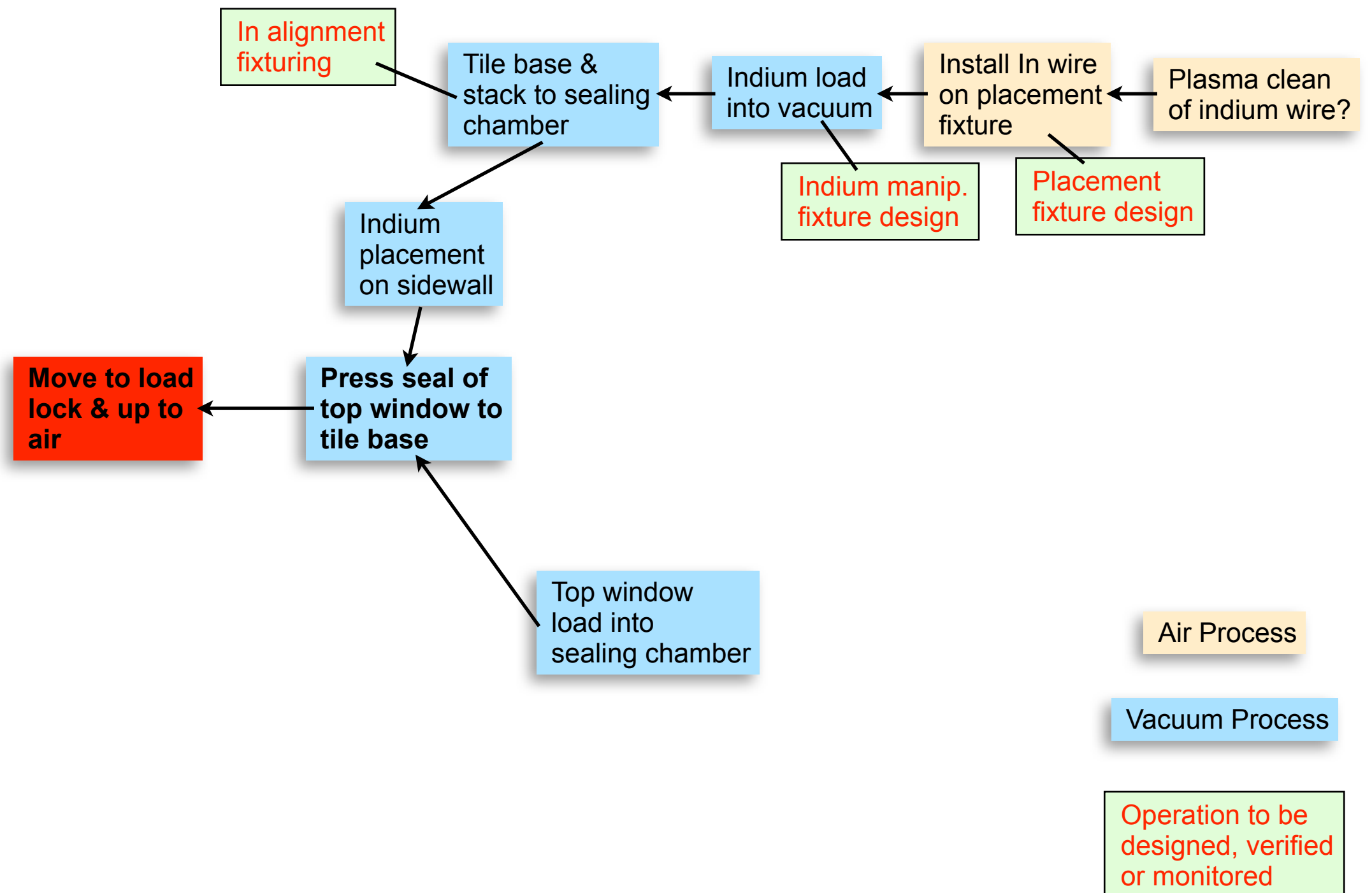
Single Tile Processing System Tube Flow Tile Base & Internals



Single Tile Processing System Tube Flow Photocathode Fabrication



Single Tile Processing System Tube Flow Indium Seal Load & Final Seal



Task List & Schedule

- ▶ 8 Inch Single Tile System follows proving of technology in 6 cm STPS
- ▶ Expect 1.5–2 years from design start to completion assuming adequate funding
- ▶ Currently minimal design work ongoing due to budget constraints

Design Preparation and Evaluation			In process
5.1	8STF5100	Write Response to Initial Design Review	
5.1	8STF5110	Review, Evaluation and Preparation	
Vacuum Transfer System			model drawing
5.2	8STF5210	Design Vacuum System and Sample Handling Components	
5.2	8STF5220	Review Vacuum System Design	
5.2	8STF5230	Procure Vacuum Transfer System Components	
5.2	8STF5240	Assemble Vacuum Transfer System	
5.2	8STF5250	Commission Vacuum Transfer System	
Photocathode Subsystem			scale-up from 6cm
5.3	8STF5310	Design and Instrumentation Specification	
5.3	8STF5320	Review Photocathode System Design	
5.3	8STF5330	Procure Photocathode Components	
5.3	8STF5340	Delivery of Photocathode Internals	
5.3	8STF5350	Assembly of Photocathode Internals	
5.3	8STF5360	Test Photocathode Chamber	
5.3	8STF5370	Industrial Technology Transfer - Photocathode	
MCP Scrubbing Subsystem			scale-up from 6cm
5.4	8STF5410	Bake, Scrub and Instrumentation Design	
5.4	8STF5420	Procure Bake and Scrub Components	
5.4	8STF5430	Delivery of Bake and Scrub Components	
5.4	8STF5440	Assembly of Bake and Scrub Internals	
5.4	8STF5450	Test Bake and Scrub Chamber	
5.4	8STF5460	Industrial Technology Transfer - MCP Scrubbing	
Detector Sealing Subsystem			scale-up from 6cm
5.5	8STF5510	Design Sealing System	
5.5	8STF5520	Procure Sealing Chamber Components	
5.5	8STF5530	Delivery of Sealing Chamber Components	
5.5	8STF5540	Assembly of Sealing Chamber Components	
5.5	8STF5550	Sample Registration Testing	
5.5	8STF5560	Testing of Sealing in Air	
5.5	8STF5570	Testing of Sealing in Vacuum	
8" Tile integration			
5.6	8STF5610	Commissioning 8" Tile System	
5.6	8STF5620	Produce First 8" Tile	
5.6	8STF5625	Successful 8" Tile	
5.6	8STF5630	8" Tile Production	
5.6	8STF5640	QA 8" Tiles	
5.6	8STF5660	Field Deployment	
5.6	8STF5650	Project Success - 25th Tile	

Conclusions & Discussion

- ▶ 8 Inch Single Tile Processing System remains a primary goal of LAPPD2 program at Argonne
- ▶ Will be an important component of the tech transfer process
- ▶ Component cost is ~\$765k and time scale is 1.5–2 years from start
- ▶ Requires funding commitment to begin
- ▶ Design and techniques are being vetted in 6 cm STPS