



Argonne
NATIONAL
LABORATORY

... for a brighter future



U.S. Department
of Energy

UChicago ►
Argonne_{LLC}



U.S. DEPARTMENT OF ENERGY

A U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC

Processes for the Construction of Photo-detector Tubes

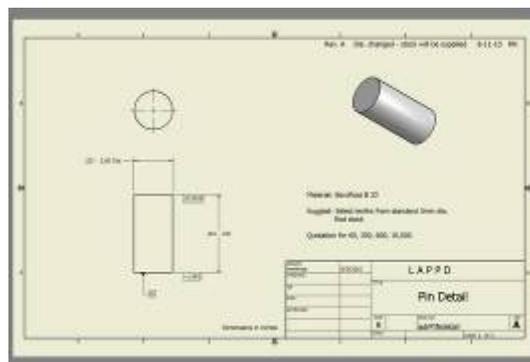
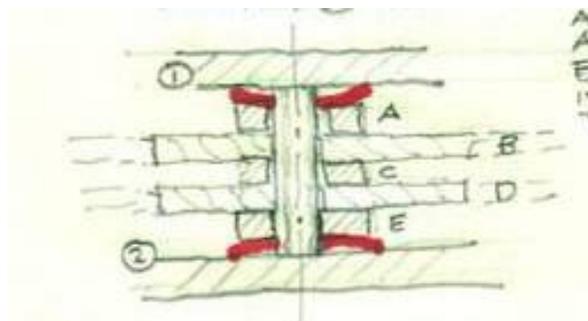
*Dean Walters
Argonne National Laboratory*

Requirements of a Tube Construction Laboratory

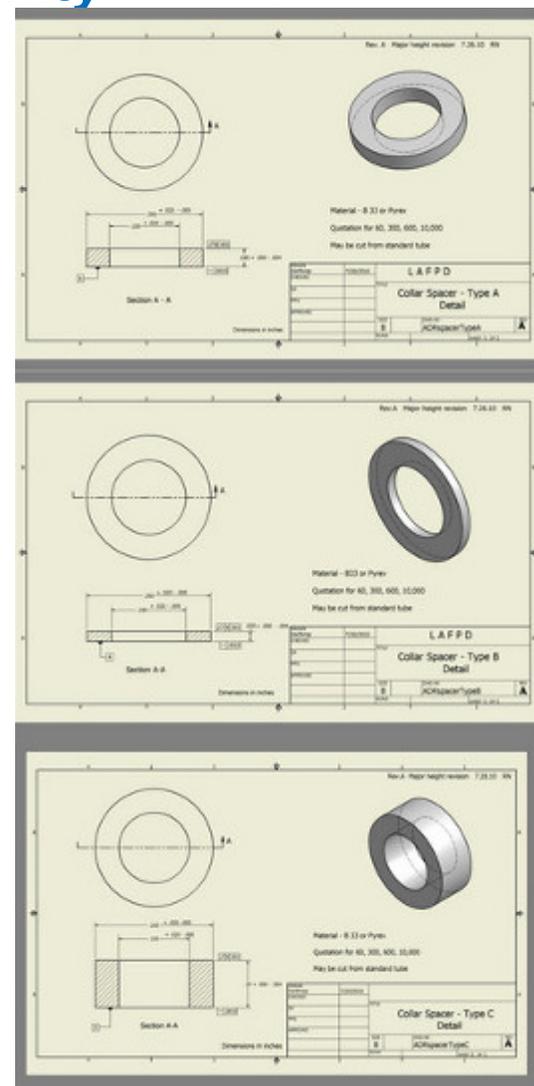
- Center will need to include:
 - Wet chemistry cleaning
 - Plasma Etching
 - Vacuum Firing
 - Test Equipment
 - Photocathode deposition and photo-detector assembly system
- The center should locate all of the operations in a central location to minimize handling and to control the surface qualities for repeatable results.
 - The center needs to control dust and particulate contamination.
 - It needs to control temperature and humidity, important in the Midwest.
 - It needs services for water, electrical, dry nitrogen, liquid nitrogen, compressed air, process gases, and exhaust gas venting.
 - It should be near the materials characterization laboratories.
- This will be the central point where the parts from external suppliers will be delivered
- This is a tube construction center where the anticipated production rate will be > 6 units a week.

Components That Will Undergo Cleaning/Processing in the Facility

- MCP's
- Glass Top Plates
- Anode/Sidewall Assemblies
- Spacer Collars
- Spacer Pins
- Spacer Retainer Rings
- NEG Strips
- NEG Strip Spacers

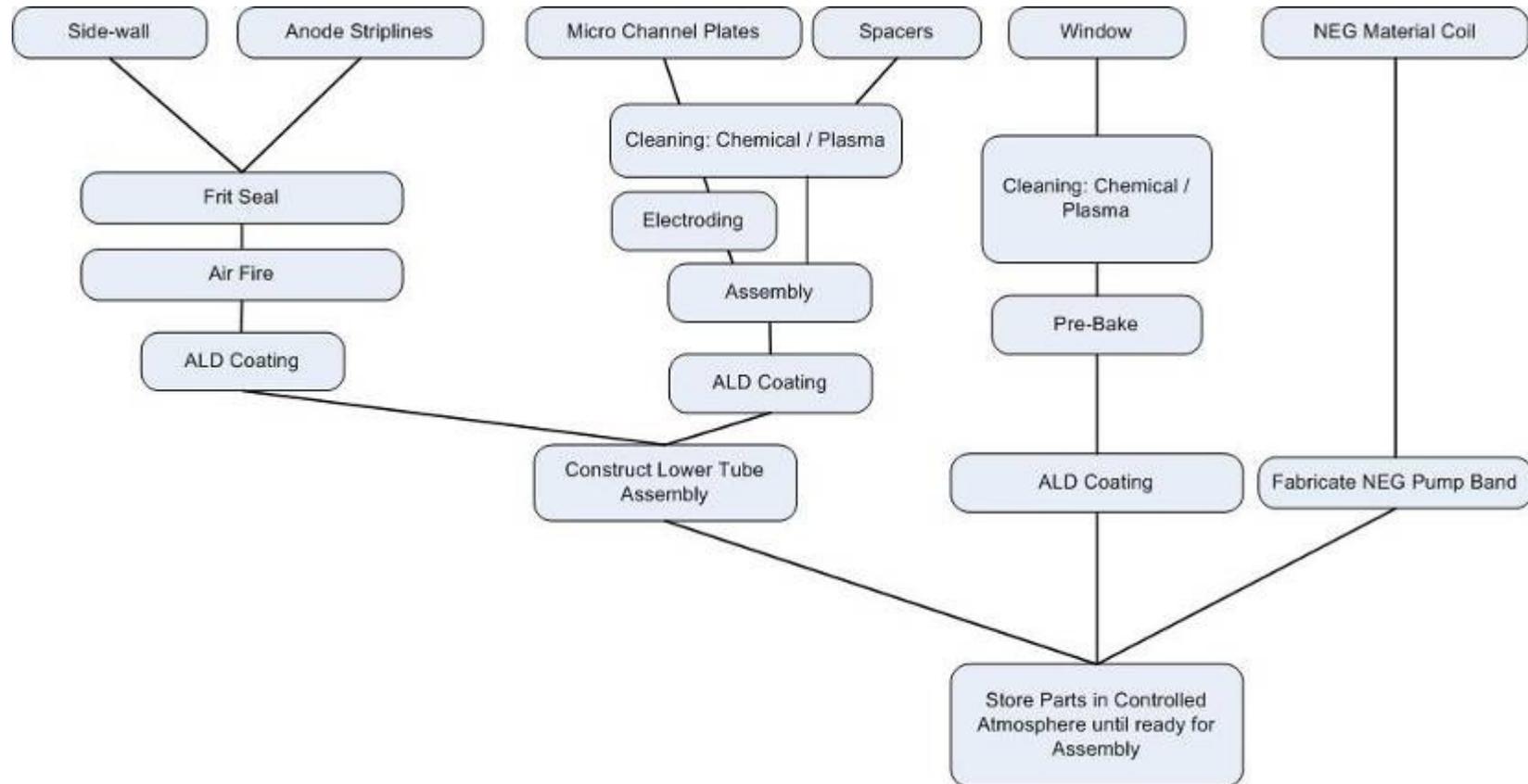


Drawing by R. Northrop, Engineer

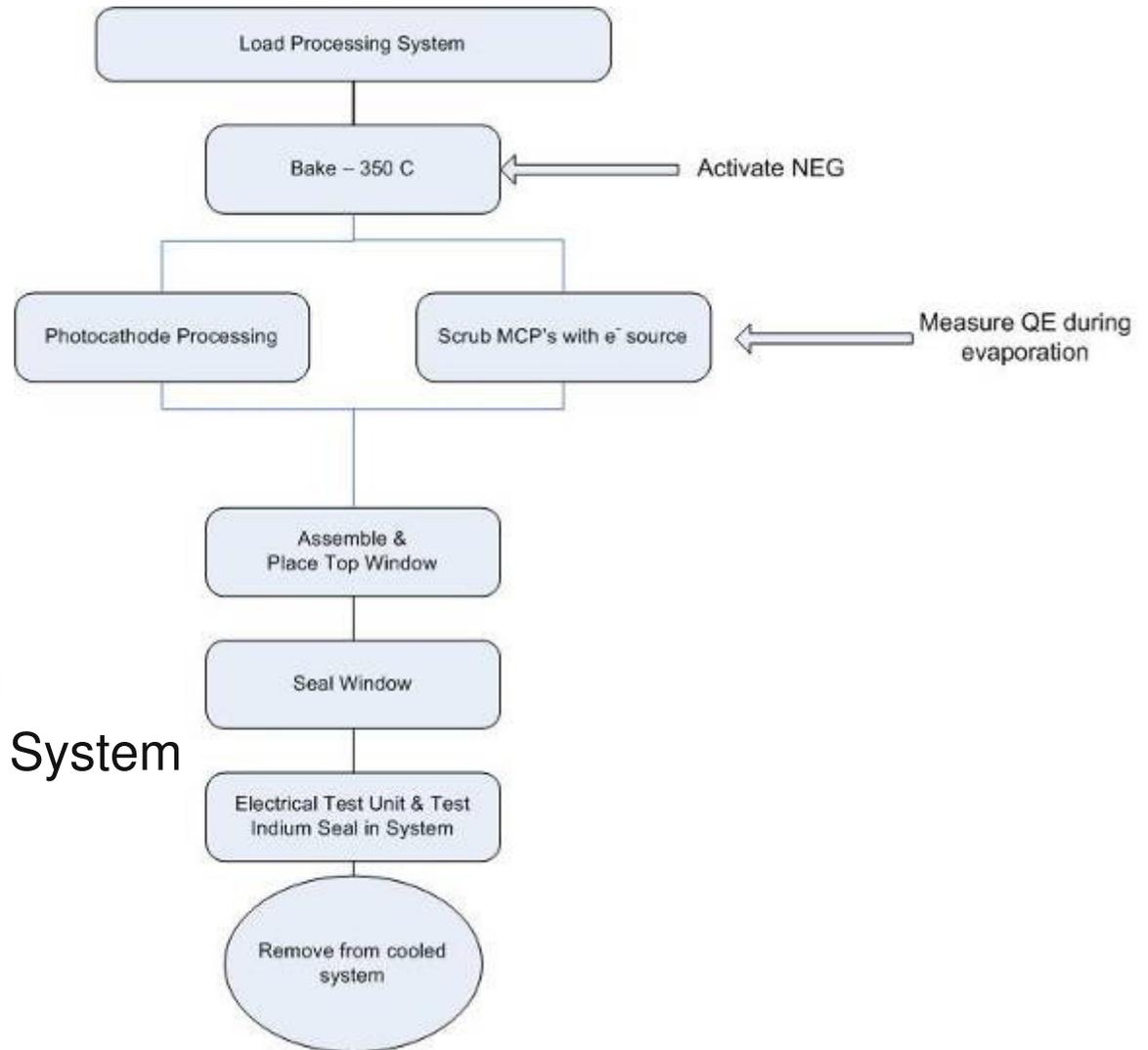


Initial Steps

- Prior to starting the construction of the tube the parts need to be prepared.



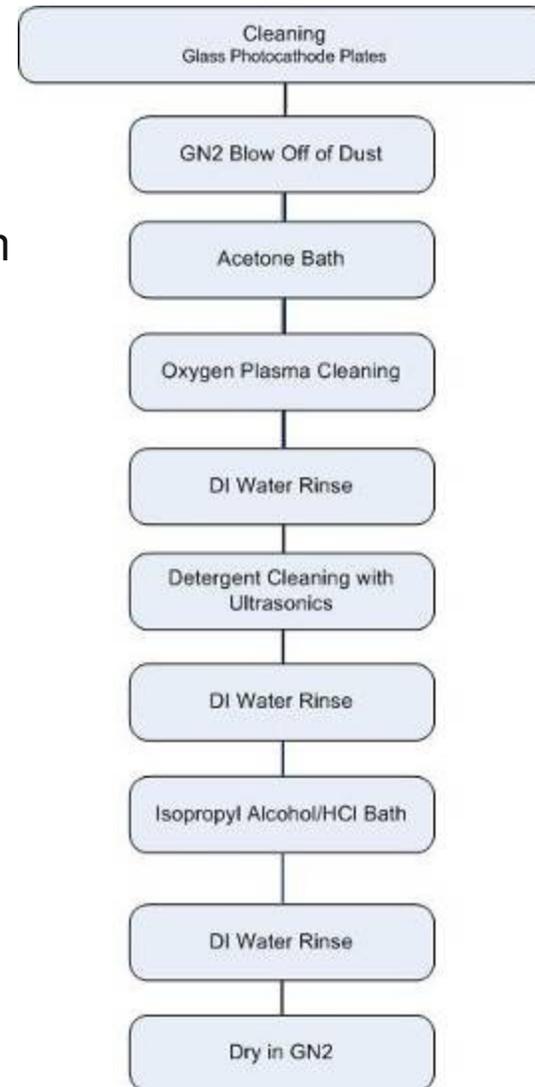
Outline of Processes for the Manufacture of a Photo-detector Tube



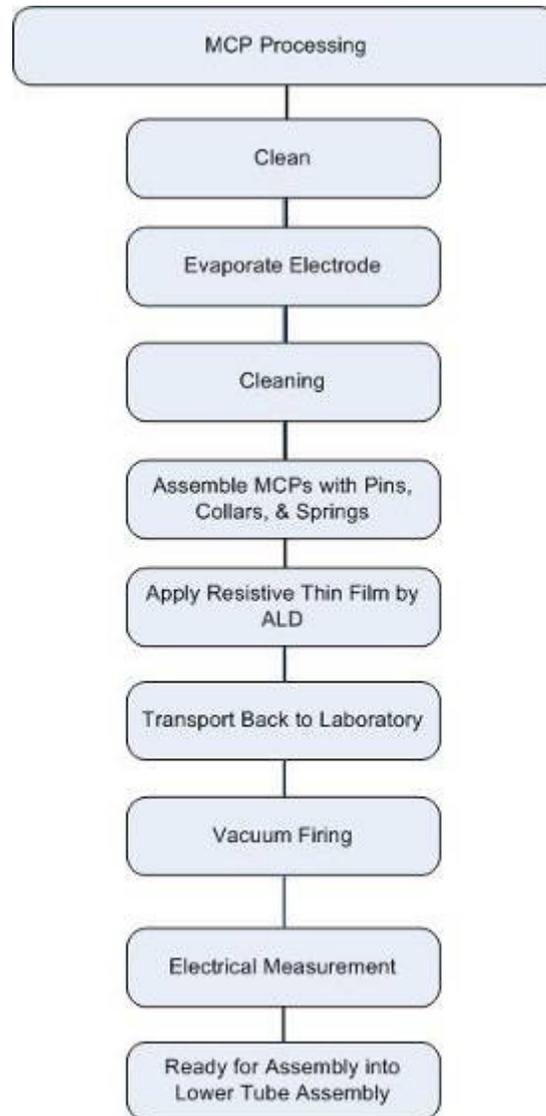
- Lower Body Construction
- Cleaning Facility
- Photocathode Fabrication
- Photo Detector Assembly System

Cleaning Process

- As materials and parts arrive they will have to pass through quality assurance verification before starting cleaning and processing steps.
 - As materials are received a coupon will undergo a limited characterization to discern its properties
 - Parts will pass through a QC step to insure conformance to dimensions.
- Parts will then be cleaned.
- Parts will have any coatings applied to them
- Subassemblies will enter the Processing Area where:
 - Final baking
 - Photocathode evaporation
 - MCP Scrubbing
 - Testing
 - Tube Sealing

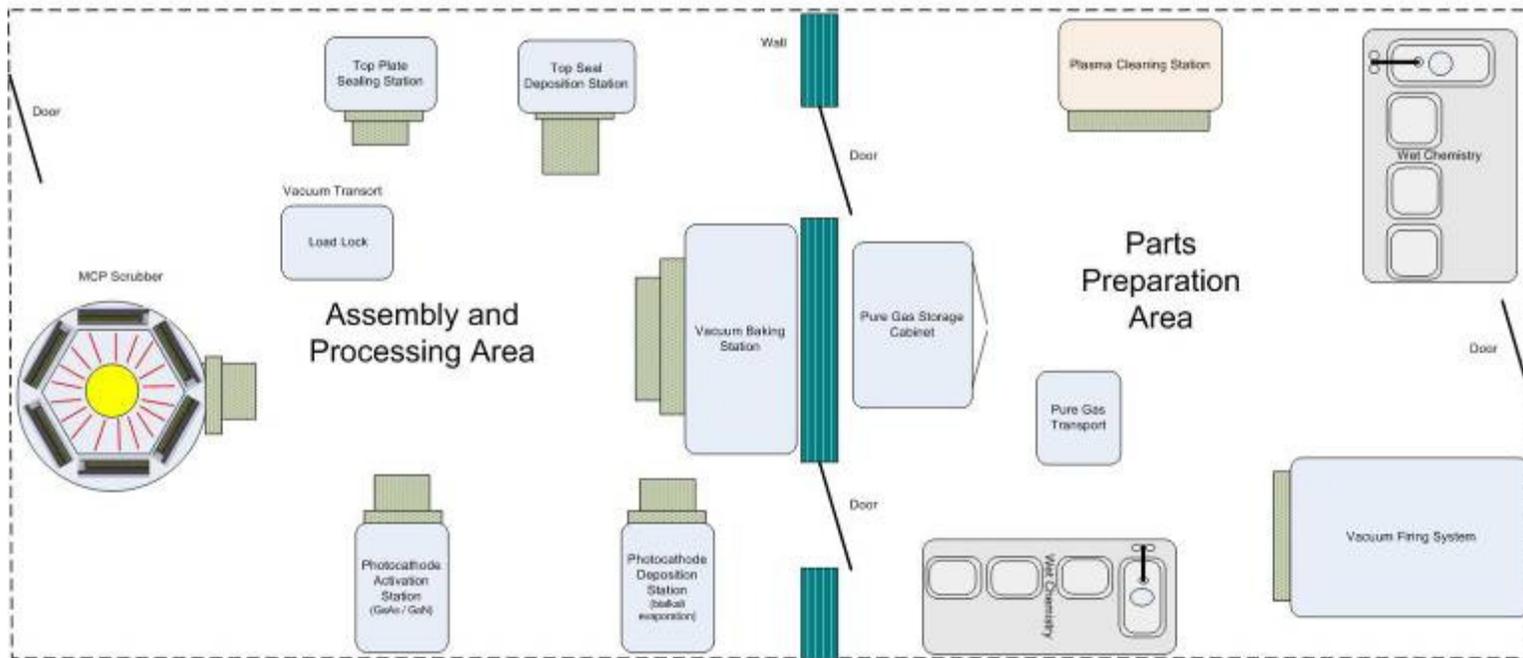


Tasks for the Construction of an MCP



Proposal of Laboratory Layout

Lab Layout #1



Proposal of Laboratory Layout

Lab Layout #2

