



HT / LT SERIES

SMALL BATCH FURNACE SYSTEMS

MRL HT / LT SERIES



HT/LT 1018 (2-stack)



PRODUCT NEED

- The HT / LT Series furnace systems were developed in the late 1990's in response to:
 - ✓ End users that had small batch processing needs for both production and development work.
 - ✓ Production size equipment was less desirable for small batch because of:
 - Price
 - Footprint and capacity that was not fully utilized
 - Tube volumes and consumable sizes that were larger than required for small batch needs
 - ✓ Customer demand for small batch processing with DDC / Supervisor based controls and cantilever loading.
 - ✓ Customer demand for single tube and two tube furnaces - rather than the expense of a 4-tube unit with tube levels that are depopulated.
 - ✓ Customer demand for single tube units that possess features to carry forward small batch and R and D into production equipment.

PRODUCT DEVELOPMENT

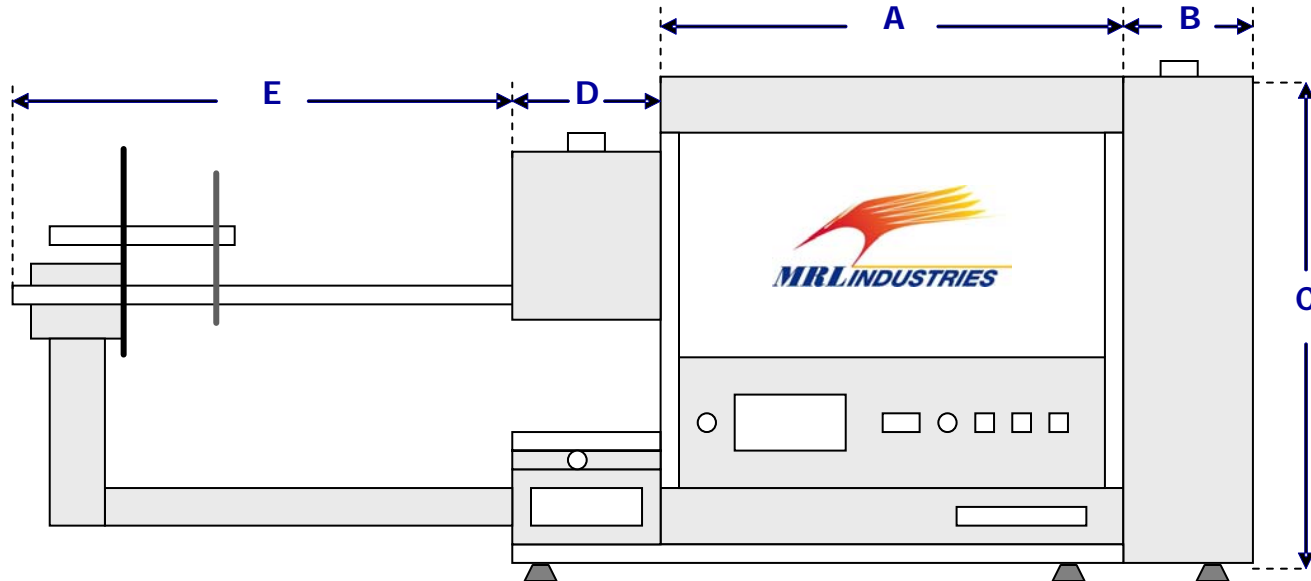
- Engineering and Manufacturing Considerations
 - ✓ Produce a cost effective alternative to table top furnace systems that incorporate DDC control, auto loading as an option, MFC gas systems, variable incoming power, various models to accommodate both small batch sizes and substrate sizes.
 - ✓ Incorporate features from production tools
 - Profiling capability
 - Gas enclosure / cabinet
 - DDC Controls as a standard with the option of master / slave
 - Host / Supervisor capability with the option to operate a DDC as a stand alone
 - Design the tool with capability of mimicking production environment - baffling, dummy boats, etc.

PRODUCT SOLUTION

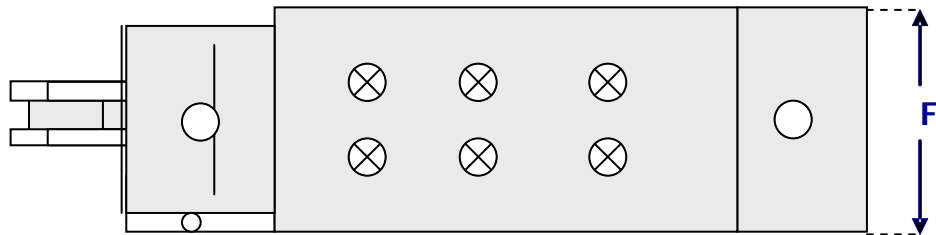
- The HT / LT Series Systems are available as:
 - ✓ 150mm and 200mm Models
 - 1 or 2 tube unit (stacked) available
 - 10.0" and 16.0" linear Thermal Flat zone
 - ✓ 300mm Model
 - 1 tube
 - 10.0" linear Thermal flat zone
 - ✓ Temperature Range
 - HT - Standard as 1200 C model, Available in 1350 C model
 - LT - Standard as 850 C
 - ✓ DDC control system or Master/Slave
 - With Host compatibility or as as stand alone
 - ✓ Manual or Automated Loader
 - Axxess (Cantiliever) Loader
 - Manual Load



MEASUREMENTS



Loader in
CLOSED
position



TYPICAL DIMENSIONS

	Model 1012	Model 1018	Model 1312	Model 1318	Model 1912
Wafer Size	6" (150mm)	6" (150mm)	8" (200mm)	8" (200mm)	12" (300mm)
Thermal Flat Zone	10.0"	16.0"	10.0"	16.0"	10.0"
A	48.5"	54.0"	62.0"	68.0"	68.0"
B	10", 28"	10", 28"	10", 28"	10", 28"	10", 30"
C	41.0"	41.0"	48.0"	48.0"	60.0"
D	9.5"	9.5"	9.5"	9.5"	12.0"
E	51.0"	54.0"	58.0"	65.0"	58.0"
F	24.0"	24.0"	24.0"	25.0"	34.5"
Base Stand (Optional)	Adds 10" - 20" to height				

- ✓ Estimated dimensions are for single-stack systems
- ✓ May differ based on final configuration and options

YESTERDAY'S TECHNOLOGY

- ✓ The previous table top, the Maxi Mite, is still a valid product as shown to the right.
- ✓ The theory of design and assembly are very different in today's HT / LT that mimics production model furnaces.
- ✓ The Maxi Mite series is a modular bolt together design that provides design flexibility and simple plug in operation. Though cost effective as a stand alone heat source, today's desire for DDC operation, MFC gas systems and automated loading became a cost effective design challenge for this tool type.



- ✓ Today's HT / LT series incorporates a welded frame design as a freestanding unit that easily accommodates more variables such as gas cabinet size and thermal load zone length within the same theory.

TODAY'S TECHNOLOGY



- The HT / LT series remains a “plug in type” furnace, but carries with it a production look and feel.
- The unit is assembled and ships as a single unit. Upon arrival, placement, leveling and facility hook-up is quick and easy.
- Some flexible options include:
 - ✓ Linear thermal flat zones.
 - ✓ Variable Gas Enclosure Lengths to fit the process requirements
 - ✓ Models for up to 300mm substrate sizes
 - ✓ Models for temperature ranges of 300 C to 1350 C.
 - ✓ Manual or auto load. Auto load is easily retrofitted from the field.
 - ✓ Control Systems – ICCI, SEMY, or Master/slave controllers

TODAY'S TECHNOLOGY

- ✓ All models come standard with the ICCI or Semy Controller, but are available with master / slave temperature only control
- ✓ The Micro Controller operates as a stand alone DDC or as an option interfaces to a Windows based host system as well as engineering terminal(s)
- ✓ Auto loading is operable in manual mode or under DDC control with adjustable speed.



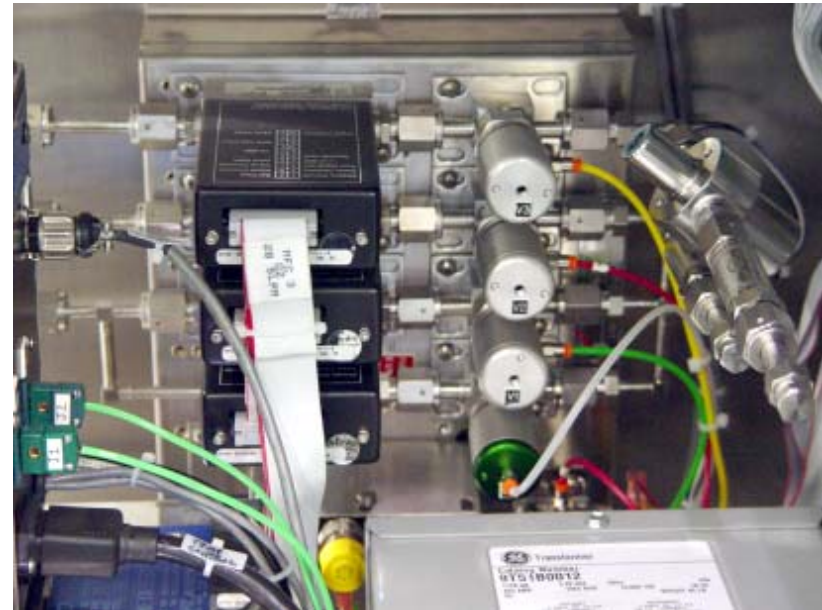
- ✓ All models are available with fans, a heat exchanger or a single point bonnet to draw heat out of the furnace section.
- ✓ All models are available with an optional SST welded frame to bring the height to an appropriate ergonomic level.

FEATURES

- Back to back install capability
 - ✓ The design allows for full front access to make back to back installations a feasible solution to maximize clean room space / utilization.
- Independent exhaust
 - ✓ Each scavenger barrel has an independent tube level exhaust extension
- Stable, Supported Controllers
 - ✓ MRL furnaces typically use the ICCI or Semy (AMAT) brand of controllers.
- MRL heating technology
 - ✓ All HT / LT's come standard with Magna AZ or Magna SW Technology and are designed to target customer process requirements.
- MRL packing kit technology
 - ✓ MRL furnaces incorporate our tooled v blocks and soft insulation packing materials to control heat loss.
- MRL Axxcess Loader
 - ✓ The best of both worlds: Reliability & Repeatability.

GAS DELIVERY SYSTEM

- Flow Loop Design
 - ✓ Each Flow Loop includes 1/3PSI Check Valve at main inlet, 0.03 μ Point Of Use Filter (POUF), MFC and Pneumatic Valve
- Construction
 - ✓ Plumbing Assembly constructed of 316L electropolished Stainless Steel Tubing (1/4" - R_a 10) orbital welded with Microfit Fittings in lieu of bends
- Assmebly
 - ✓ All MRL plumbing assembled in a class 100 cleanroom environment



FURNACE SECTION

- HEATING TECHNOLOGY
 - ✓ MaGNa AZ for high temperature
 - ✓ MaGNa SW for low temperature
- SPIKE & PROFILE THERMOCOUPLES



LOADING SYSTEM

- The integrated Axxess Loading system was designed and developed through the use of 2 common models used on our heavy production furnaces. We have taken the features from our well known SP model and integrated it with the high end Z series to create a cost effective automated solution for a single tube furnace.



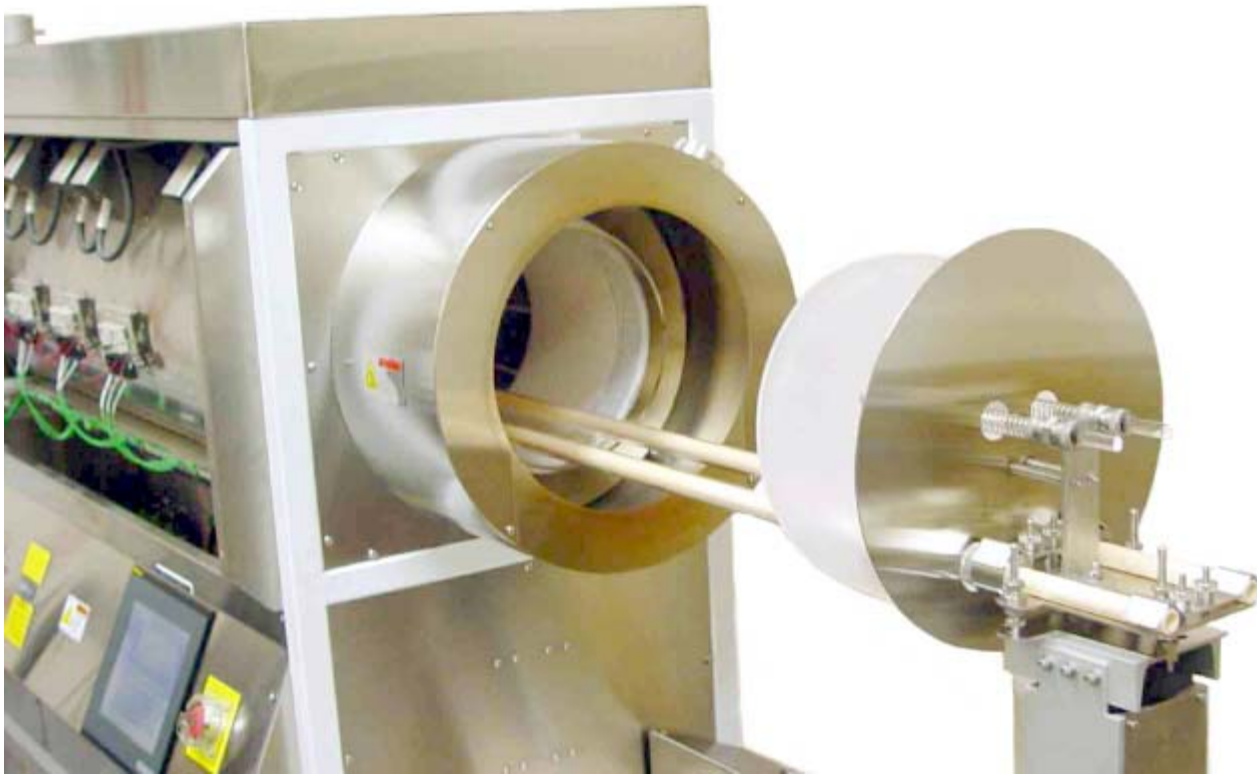
LOADING SYSTEM

- ✓ The Axxess loading system gives users “push button” type loading that yields repeatability.



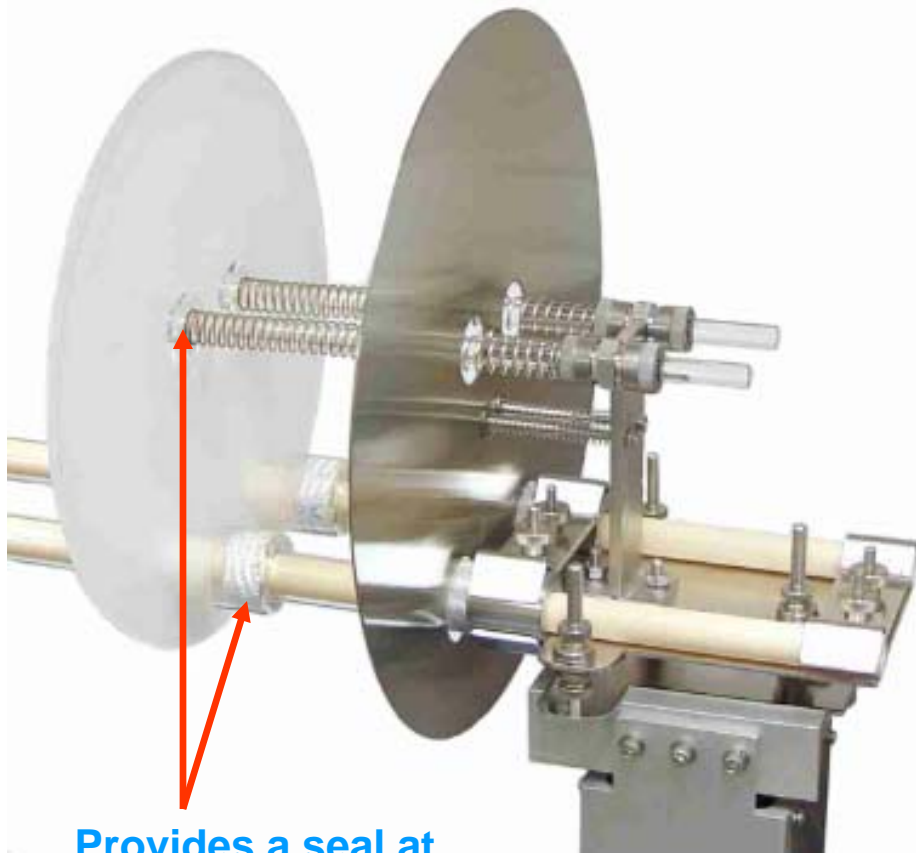
- ✓ The use of twin alumina rods provides a cost effective, readily available material in lieu of long lead and expensive SIC type paddles. It also allows for the flexibility to change the inexpensive quartz sheaths for multi use furnace tubes in lieu of cleaning SIC.

LOADING SYSTEM



- Door open view shown

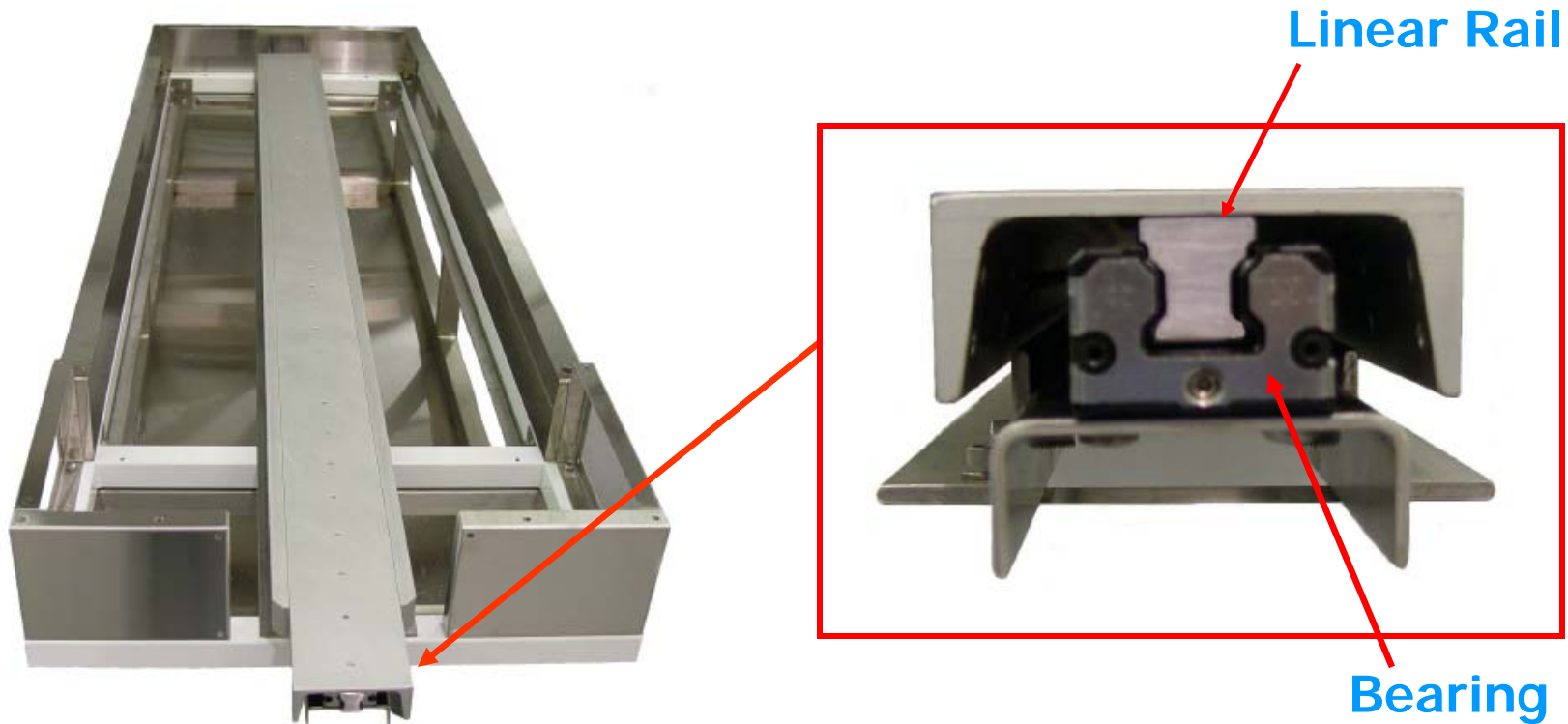
LOADING SYSTEM



Provides a seal at the front and back side of the quartz door.

- PADDLE SEAL TECHNOLOGY
 - ✓ The quartz sealing design where the quartz nails and rods are sealed by sliding quartz pieces and soft insulating materials that have proven results to improve exhaust draw to the exterior points of the tube and door provide consistent process uniformity's.

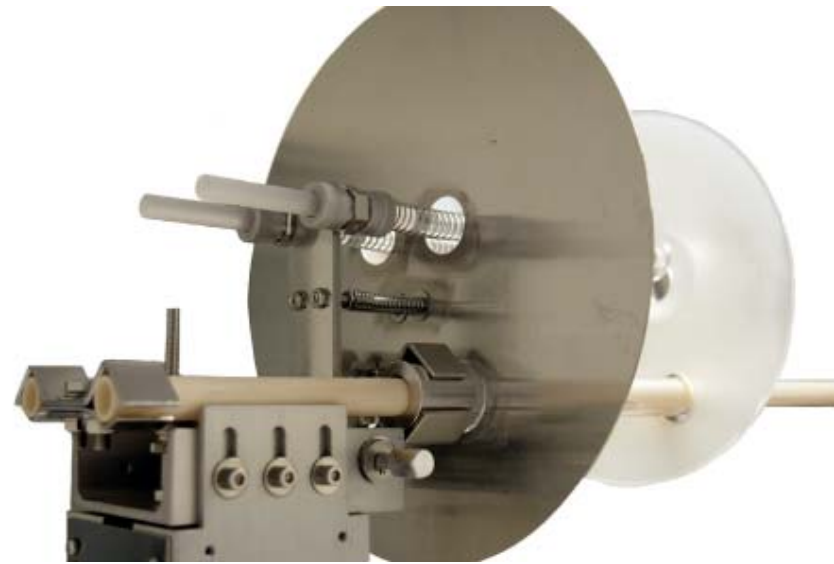
AXCESS LOADING



- ✓ Ladder Chain driven, the precision linear rail slides through self grease bearings to minimize maintenance while providing a smooth ride.

LOADING SYSTEM

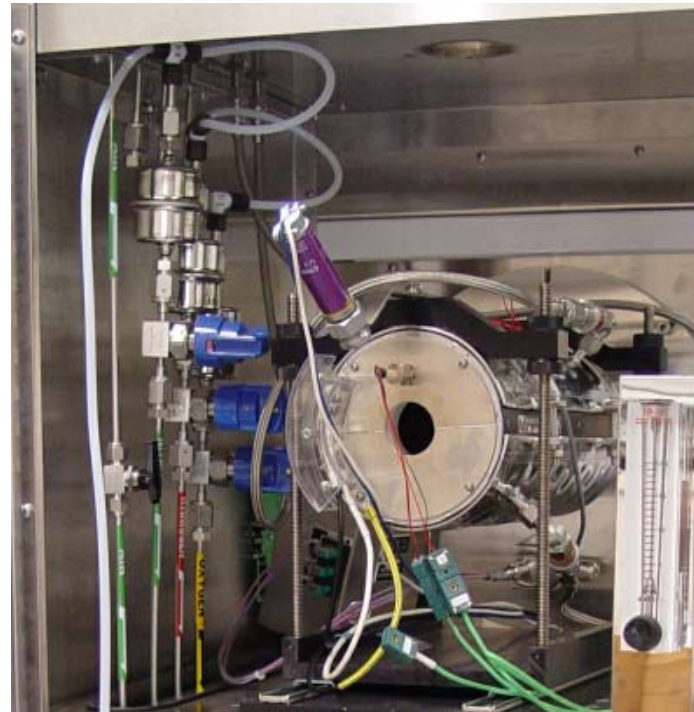
- ✓ Access Loader Control Box with power supply, shown below with toggle switch for DDC or Manual Mode of Operation.
- ✓ Motor and Gear are directly below black panel for ease of maintenance



- ✓ Head Assembly for Atmospheric or LPCVD applications
- ✓ Has three modes of adjustment

PROCESS TYPES

- All process types available both Atmospheric and LPCVD.
- Most common applications:
 - ✓ Wet / Dry Oxidation
 - ✓ Wet - both Pyrogenic and DI steam
 - ✓ Anneal(s)
 - ✓ N₂, Ar, FMG
 - ✓ Polysilicon
 - ✓ Nitride
 - ✓ Diffusion



- Pyrogenic torch shown