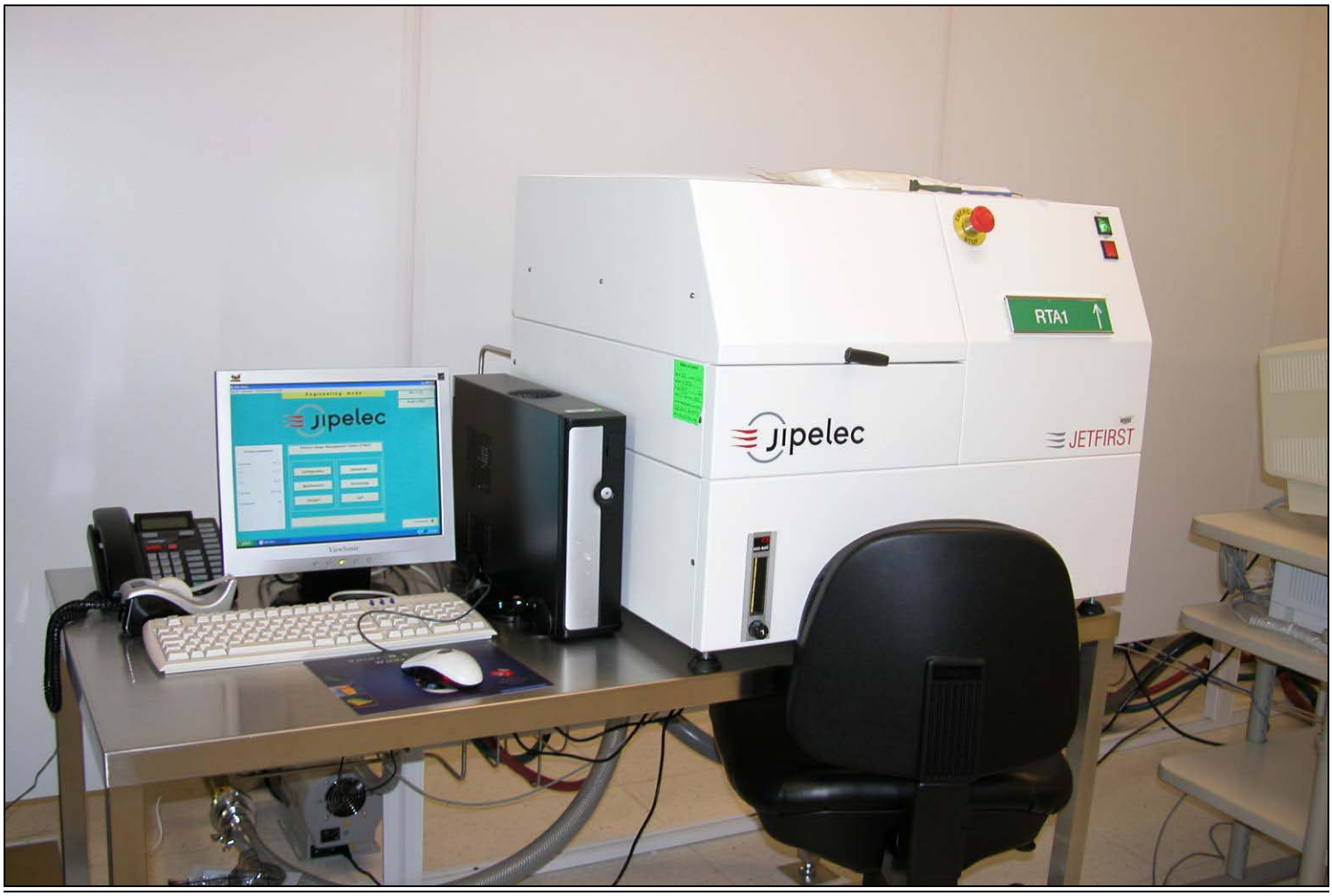
Center for Integrated Nano-Technologies

Operating Procedure for Jipelec Jetfirst 150 RTA located in Bldg 518, Room 1525



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1. PURPOSE

This document provides the necessary information for the safe use of the Jipelec Jetfirst 150 RTA (RTA1) located in The Center for Integrated Nano-Technologies (Bldg 518), Room 1525. Any questions beyond the scope of this document should be directed to the equipment owner.

2. ACRONYMS

Many pieces of equipment and procedures are known almost exclusively by their associated acronym, it is important to become familiar with the following list to avoid confusion.

SNL- Sandia National Labs
CINT- Center for Integrated Nano-Technologies
SOP/OP- Standard Operating Procedure/Operating Procedure
OSHA- Occupational Safety and Health Administration
ES&H – Environmental Safety and Health
S&S- Safeguards and Security
QA- Quality Assurance
PM- Preventative Maintenance
UV- Ultra Violet
HV- High Voltage
TGMS- Toxic Gas Monitoring System

3. DEFINITIONS

Authorized User- Personnel with the required training and subsequent approval of the Integration Lab manager to use said equipment.
CINT Key Operator- Designated Key Operators are qualified to perform tool specific training of Authorized Users, and are responsible for the maintenance of the equipment.
Visitor- Personnel trained in the cleanroom overall safety and gowning procedures, but not authorized to operate equipment.
ES&H Officer – Provides ES&H, S&S, and QA for CINT activities.
MSDS- Material Safety Data Sheet
RTP/RTA- Rapid Thermal Processor/Annealer

4. RESPONSIBILITES

It is the responsibility of every employee, contractor, and visitor to ensure a safe and healthy working environment. There is no experiment or procedure at Sandia that is so urgent that it needs to be done in an unsafe manner, and it is everyone's obligation to refuse to do work that he or she believes to be unsafe. If there is an activity or situation that is of concern it is their immediate responsibility to contact a supervisor or ES&H representative.

5. TRAINING

Prior to using any Integration Lab tools it is necessary to complete the general, site, and tool specific training. The training required for the operation of RTA1 is listed below.

5.1 Corporate Level General training

CINT personnel shall complete the following Corporate-required training courses prior to using RTA1. This list may not be inclusive, so refer to the training section of the PHS associated with the Mask Aligner for additional information.

- LAB100 - Laboratory Standard Information and Training
- LAB103 - Site Specific Laboratory Safety Training
- PRS150 - Pressure Safety Orientation
- PRS115 - Cryogen Safety
- ENV112 - Hazardous Waste and Environmental Management Training

5.2 Site Specific training

In addition to corporate-level training, site specific training shall be completed. These courses are administered through either the clean room manager or a qualified user of the equipment.

- Site Specific Training for Unescorted access to the Integration Lab
- Site Specific Training for Personal Protective Equipment
- Site Specific Training - Non-Ionizing Operation Specific

5.3 Tool Specific training

Once all corporate and site specific training has been completed, the user must schedule a walk through and training session with the Key Operator of the tools that shall be used. The user may contact John Nogan or Catherine Mombourquette for scheduling.

6. APPROVAL, NOTIFICATIONS, SCHEDULING

After reading and signing all applicable OP's, finishing all associated training, and receiving the express permission from the Integration Lab manager the Authorized User will be issued an Integration Lab badge indicating that they have been trained to use the Integration Lab and specified equipment. A user must have their badge above the waist outside their cleanroom suit at all times when in the Integration Lab. NOTE: The Integration Lab badge is not a substitute for the users' DOE issued badge. The DOE badge must also be worn at all times while in the CINT facility. To reserve a tool the user must go to the CINT calendar located at http://cint.lanl.gov/integration_lab/tool.calendar.shtml.

7. SAFETY PRECAUTIONS AND LIMITATIONS

This section describes hazards identified with the Jipelec Jetfirst 150 RTA (RTA1) in Room 1525. Authorized users and service personnel must be aware of all hazards associated with this machine at all times. It is important to be able to recognize hazardous conditions when using a machine, as well as while the machine is being serviced. Applicable training must be met before using this piece of equipment.

There are several major hazards to personnel:

- Toxic/Corrosive Material
- Electrical Shock
- Over Pressure Hazards
- Toxic Hazard
- Mechanical pinch hazards
- Fire Hazard
- Imposion Hazard

During normal operation, RTA1 is an inherently safe tool and has limited possibility of exposure to hazards. Only the CINT Key Operator(s) may open the tool or perform maintenance. However, to better inform the user we have included the following information on the internal hazards of the tool.

7.1 Toxic/Corrosive Material

Thermal or burn hazards exist inside the RTA during operation but not on the exterior of the machine. The RTA side panels should not be removed when the system is hot and should only be performed in the presence of two trained personnel.

7.2 Electrical Shock

There is a threat of exposure to surfaces powered by voltage sufficient to deliver lethal currents; and, additionally, at sufficiently high current levels as to present a hazard for electrical arcing, fire, and/or molten metal spattering resulting in burns and/or eye injury. These electrical hazards are all contained within the metal box of the RTA. The protective panels should not be removed except in the presence of two trained personnel. Maintenance shall be performed only by Key Operators. Prior to performing any hot electrical maintenance, approval must be obtained from the Key Operator. Operating policy requires that at least two persons must be present when any hot electrical maintenance or troubleshooting is being performed. In additional, for hot electrical maintenance, someone in the area must have CPR training.

7.3 Over Pressure

The RTA is protected from over pressure during purge or stand-by cycles by a 1/3psi vent valve.

7.4 Implosion Hazards

An implosion hazard exists during the pumping and evacuation cycle if the quartz chamber window were to fail. The hazard is contained by the machine design that encloses the chamber in a stainless steel housing.

7.5 Mechanical pinch hazards

Any equipment that has moving parts will have some sort of pinch hazard. The mask aligner has several moving pieces, some of which move independently of manual operation. It is important to be alert when working near moving parts. Some examples are the UV exposure hood, the top side alignment optics, bottom side alignment optics, and the alignment stage.

8. SPECIAL TOOLS, EQUIPMENT, PARTS, AND SUPPLIES

Designated Key Operators are qualified to perform tool specific training of Authorized Users, and are responsible for the maintenance of the equipment. An Authorized User should NEVER perform maintenance of equipment.

9. SYSTEM OPERATING AND MAINTENANCE PROCEDURES

After completing all applicable training and checking schedule for availability, a user may now operate the RTA. Even after training it is a good idea to keep a copy of protocol with you to ensure appropriate usage. Improper usage can be detrimental to a users experiment and extremely costly to the tool.

9.1 Set-Up and Preparation

Operation of the RTA is to be performed in accordance with the manufacturer's directions and is to be accomplished only by Key Operators or authorized users. Additional information for the various cases of machine operation is described below.

9.2 Operational Procedure

The RTA is controlled by menu driven software that prompts the user for inputs. Commands are entered by using the mouse to select the appropriate menu item. The procedure below details the steps for standard operation. Steps that have prompt messages from the program on the screen with clear responses are not included below.

**Note: The first time the RTA is used it must be powered on unless it is already in "standby" mode, which should be the case for daily operation. To energize the machine switch on the circuit breaker labeled "circuit breaker" on the rear of the RTA. Power on the RTA computer system and depress the green START button on the RTA. The system is now in "standby" mode.

1) When the RTA is powered on, the machine is controlled by the computer from the JETFirst PIMS software. Start the software by double-clicking on the shortcut located on the computer desktop.

2) To gain access to the control program, the user shall use their password in lower-case letters. Passwords are assigned and controlled by the Key Operators.

3) When access is realized, the user is at the main menu control screen. Click on the "Parameters" icon in the upper-right corner to display the equipment status panel on the screen. Select "Processing" to begin your run.

4) Select the process you would like to run from the pull-down menu in the recipe download section. Press the "Download" button. The pyrometer calibration should read "snlpyro", if not contact the Key Operator. Process names have the following standard nomenclature: process gas identifier, vacuum or atmosphere identifier, process temperature, process time.

Example: NV40015s – Nitrogen, Vacuum, 400C, 15sec
AA175h – Argon, Atmosphere, 175C, 1 hour

Only key operators are permitted to enter or modify recipes.

5) After the system reports that the download was successful, press the “start processing” button. When instructed, open the chamber lid to load your samples.

6) Load your samples in the appropriate susceptor. Place the susceptor on the quartz carrier with the top and bottom thermocouple contacting the susceptor. Close the chamber lid.

**Warning: the thermocouples are fragile and should be handled with care. The very tip of the thermocouple must make contact with the susceptor.

7) Press the “Start Processing” buton on the software. At any time during your process, the process may be aborted safely by pressing the “stop” button on the software.

8) Record your process run in the logbook during the run. The run number, date, operator name, sample ID and material, TC1, TC2 and the pyrometer temperatures should all be noted.

9) Save your process run as “RTA###” in the historicals directory with the #### being the next sequential process run number in the logbook. Record the operator name and any comments about the run in the appropriate sections. The record of your run can then be reviewed at a later time. Press “exit” to return to the main menu. To review your run data, press “historicals” and select the appropriate run file from the drop down menu.

9.3 Clean-up/Shut down

1) The system will enter an automatic 4 minute cooling cycle. If the system has not reached 90C by the end of the cooling cycle, contact a Key Operator. When the cycle has ended and the TC temperatures have reached below 90 degrees Celsuis, open the chamber lid and remove your susceptor.

2) Close the chamber lid.

3) Exit the Jiplelec PIMS software. The system is now in “standby” mode.

4) The system can be restarted for use from “standby” mode by restarting the Jiplelec PIMS software.

9.4 Troubleshooting

Software Error Recovery

Due to a software bug, sometimes the system locks up, especially during the editing of recipes. To correct for this, exit and restart the Jipelec PIMS software.

Rebooting the computer

If the systems hangs up it is sometimes necessary to reboot the control computer by depressing the RESET button.

Thermocouple Calibration

Thermocouple calibrations shall be done whenever a thermocouple is changed and at a regular interval as determined by the PM routine by running the “SNL_tc_cal” program from the main menu. The procedure is described in the instruction manual. Thermocouple calibration should only be performed by the Key Operators or designated maintenance technician.

Maintenance

Maintenance procedures shall only be attempted by trained personnel. These procedures shall only be performed in the presence of an additional observer protected by the same equipment and clothing as required for the intended operation.

Each maintenance procedure and service operation should be performed in accordance with the instructions found on pages 66-70 of the Jipelec Jetfirst 150 user’s manual. Chamber cleans consist of wiping down the stainless steel housing with an isopropanol wipe.

10. SIGNATURE OF COMPLETION

By my signature below, I affirm that I:

• Have read and understand this operating procedure (OP) entitled *Operating Procedure for Jipelec Jetfirst 150 RTA in Bldg 518, Room 1523*

• Have read and understand the PHS/HA for this laboratory and signed signature page

• Will take the required training before working with this equipment.

Name (Printed)	Signature	Org	Date
