

Chapter 4 Process Create Screen

INTRODUCTION

Using the Process Create screen (Figure 4), the user can create steps and subroutines that detail system operating parameters, and insert them into a sequence called a process.

NOTE Only users with a privilege level of Process Engineer or above can access this screen.

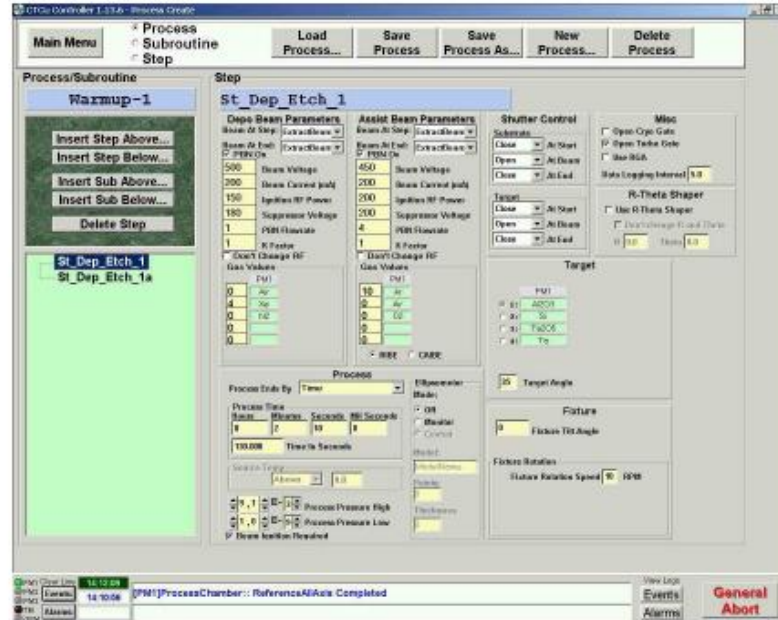


Figure 4-1. Process Create Screen

Steps and Subroutines

Each step and subroutine within the process details all the information needed by the system to perform the operation, including beam, gas, and control parameters. Once defined, steps and subroutines are inserted into a process. Note that subroutines are composed of individual steps.

Process

Each process is assigned a unique name by the user and is permanently stored on the system's hard drive, allowing the user access and editing functions when desired. The user also has the ability to select any set of steps and subroutines and create any number of new processes for specific applications. Once a new process is created, it is also permanently stored, and can be run by an operator through simple menu selections.



CAUTION—*Because the CTC hard drive stores process, configurations, and INI files, it is important to back up these files.*

Creating a Process - Overview

Shown below are the functions performed when creating steps and inserting them into a process.

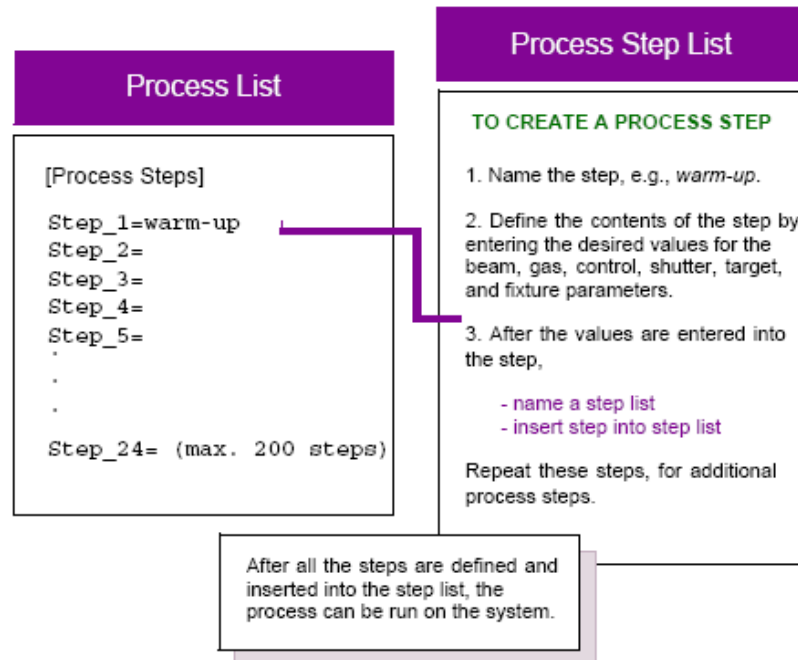
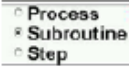


Figure 4-2. Creating a Process

Process Create Screen Button Bar

The button bar provides access to the Main Menu and to other buttons. The buttons that are displayed depend on which option  is selected. This is shown below in Figure 4-3.

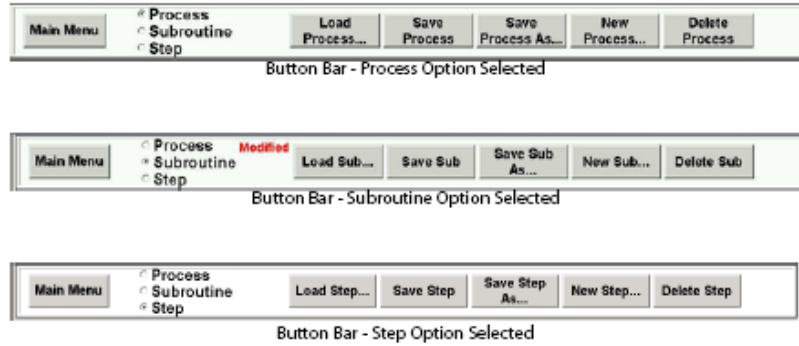


Figure 4-3. Process Create Screen Button Bar

Main Menu - Returns the user to the system main menu
Process - Provides the user access to the process create, load, and save functions
Subroutine - Provides the user access to the subroutine create, load, and save functions

Step - Provides the user access to the step create, load, and save functions

Load Process/Sub/Step - Loads a previously created process/sub/step list

Save Process/Sub/Step - Saves the current process/sub/step list

Save Process/Sub/Step As - Saves the current process/sub/step list with a user-specified name

New Process/Sub/Step - Creates a new process/sub/step

Delete Process/Step/Sub - Deletes the current process/step/sub

Process/Subroutine

The Process/Subroutine area of the screen (Figure 4-4) displays the process list and process, step, and subroutine names. It also provides the Insert buttons described below:

Insert Step/Sub Above... - Allows user to insert a step/sub above the selected step/sub

Insert Step/Sub Below... - Allows user to insert a step/sub below the selected step/sub

The **Delete Step/Sub/Process** button is also provided there. This button allows the user to delete a step, subroutine, or process.



Figure 4-4. Process/Subroutine Control Panel

5. A screen appears (Figure 4-5) that lists all the previously created steps/subroutines to choose from.

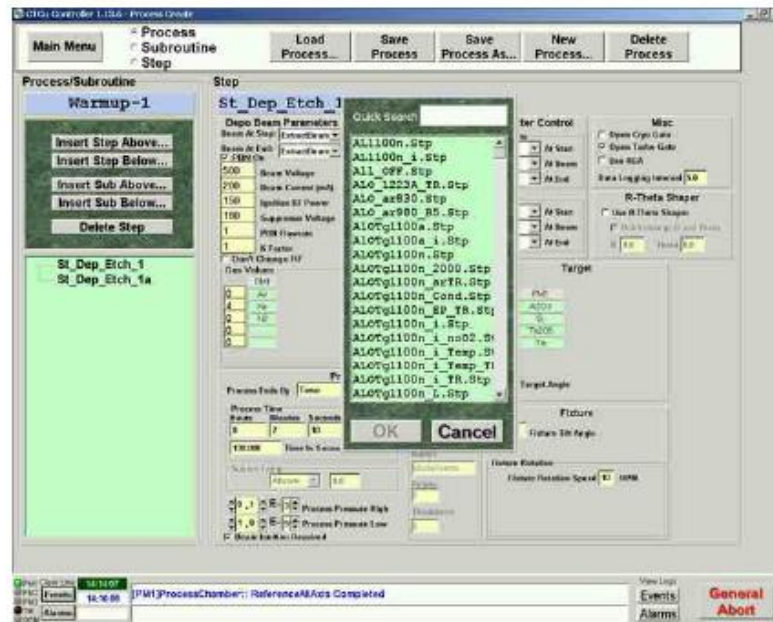


Figure 4-5. Adding Steps/Subroutines to the Process List

6. Select the desired step/subroutine by clicking on it. Double-clicking on the step/subroutine automatically adds the step/subroutine to the list allowing you to skip the next step.
7. Click on **OK**. The desired step/subroutine is added to the list.
8. Repeat this process until you are done creating the list.
9. Click on **Save Process** or **Save Process As** to save the process list. Clicking on **Save Process As** allows you save the list with a new name.

How to Edit Steps

1. Select the **Step** option.
2. Click on **Load Step**. A screen appears that lists all the previously created steps.
3. Select the desired step by clicking on it. The screen displays the parameters for the selected step.
4. Edit the parameters as necessary.
5. Click on **Save Step** or **Save As** to save the step. Clicking on **Save Step As** allows you save the step with a new name.

Assist/Depo Beam Parameters and Gas Values

ASSIST/DEPO BEAM PARAMETERS

NOTE

Because the Assist Beam Parameters panel and the Depo Beam Parameters panel provide the same functions, only the Assist Beam Parameters panel is described.

This panel (Figure 4-6) allows the user to control various beam parameters.

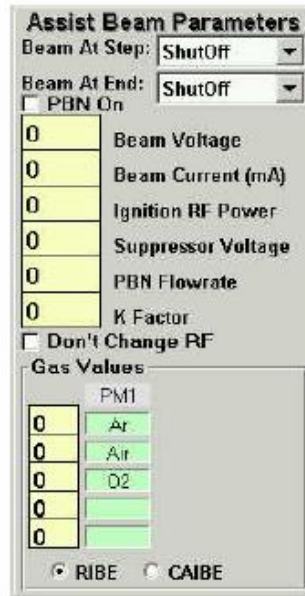


Figure 4-6. Assist Beam Parameters and Gas Values Control Panel

PBN On - When checked, applies power to the PBN and keeps power applied during the step, after beam stabilizes. If not checked, the PBN shuts off, after the beam stabilizes.

Don't Change RF - Maintains the RF value from the previous step

Beam At Step - Select ShutOff, Plasma Only, or Extract Beam from the drop-down menu

Beam At End - Select ShutOff, Plasma Only, or Extract Beam from the drop-down menu

ASSIST BEAM PARAMETERS			
Parameter	Range (see note)	Default	Description
Beam Voltage	0 - 1500V	0	Voltage level of the applied beam
Beam Current (mA)	0 - 1500mA	0	Current level of the ion beam
Ignition RF Power	0 - 2000W	0	Initial RF power output level of the RF generator. Automatically adjusts when process is done.
Suppressor Voltage	0 - 1000V	0	Voltage level applied to the PBN
PBN Flowrate	5.0 sccm	0	Amount of argon applied to the PBN
K Factor	0.3 - 5	0	Relationship between the PBN body current and beam current. Determined by the formula: $K = I_{PBN} / I_{BEAM}$
NOTE: Values may change due to power supply installed			

GAS VALUES (Figure 4-6)

This panel controls the gas flow for each channel. Gas-type labels are defined in an external ini file. Flow range labels depend on the mass flow controllers installed at each channel. To define or change the gas flow value, enter the value in the yellow field next to the desired channel label.

RIBE (Reactive Ion Beam Etching) - Routes secondary gas to ion source
CAIBE (Chemically Assisted Ion Beam Etching) - Routes secondary gas to chamber

Shutter Controls

This panel (Figure 4-7) controls shutter position during the process. At the beginning of a step, the shutter position can be either opened or closed, by selecting **Open** or **Close** from the drop-down menus. When the shutter is closed, it blocks the beam.



The Shutter Control panel is a rectangular window with a title bar that reads "Shutter Control". It is divided into two main sections: "Substrate" and "Target". Each section contains three rows of controls. Each row consists of a drop-down menu on the left and a text label on the right. In the "Substrate" section, the first row has "Close" selected in the menu and "At Start" as the label; the second row has "Open" selected and "At Beam"; the third row has "Close" selected and "At End". In the "Target" section, all three rows have "Open" selected in the menu, with labels "At Start", "At Beam", and "At End" respectively.

Figure 4-7. Shutter Control Panel

Open At Start - Opens the shutter, if selected when the step starts. At Start, information about the step is read from the hard drive (fixture, power supply, gas, etc.).

Open At Beam - Opens the shutter when the beam becomes stable. At beam conditions, all devices are ready to do step. Shutters can be moved and the counter starts.

Close At End - Close the shutter at the end of the step when 0 process time remains. Coordinated with position for the next step

Misc.

This panel (Figure 4-8) controls the use of a cryo pump and/or residual gas analyzer (RGA) in the process.

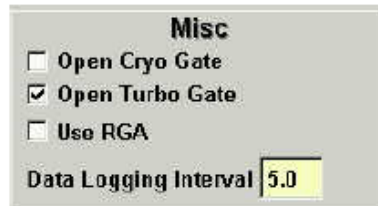


Figure 4-8. Misc Control Panel

Open Cryo Gate/Open Turbo Gate - Allows the user to choose a gate to open. At the beginning of a step, one of the two options must be selected (opened).

Use RGA - not supported

Data Logging Interval - Allows the user to enter a data logging interval (in seconds).

Fixture

This panel (Figure 4-9) controls fixture angle settings and defines the fixture rotation speed during the process.

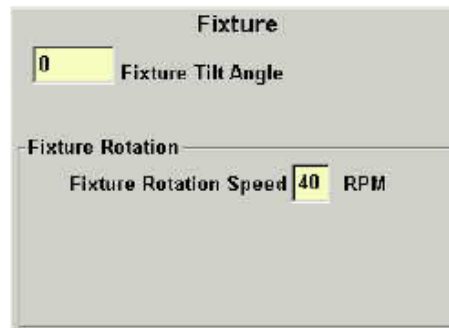


Figure 4-9. Fixture Control Panel

Fixture Tilt Angle - Allows the user to set the desired fixture tilt angle.

Fixture Rotation Speed - Allows the user to set the desired fixture rotation speed.

Target

This panel (Figure 4-10) assigns target angle to specified process module during the process. The target material is assigned using the Hardware Configuration screen (See "Hardware Configuration Screen" on page 1.)

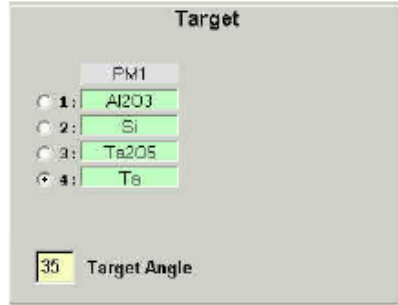


Figure 4-10. Target Control Panel

Target Angle (optional) - First, select the target by clicking on it. Then, enter the desired angle.

Process

This panel (Figure 4-11) allows the user to define the process timing and how a step in a process will end.

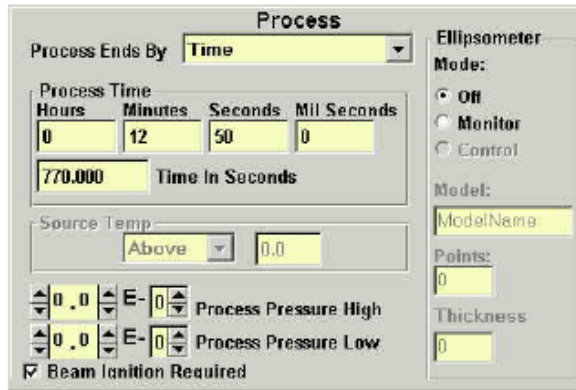


Figure 4-11. Process Control Panel

Process Ends By - Drop-down menu allows selection of time, endpoint, or Source temperature to end the process step.

Time - Use this option to end the step after the total time specified has elapsed in the running of the process. Enter time in hours, minutes, seconds, and ms as shown in Figure 4-11.

Endpoint - Use this option to end the step by endpoint. An optional endpoint computer is required and an endpoint script must be written and entered in the Endpoint Script field.

End by Source Temperature - Use this option to end the step by source temperature.

Process Time - End step after user-specified time. Time may be specified in either hours, minutes, seconds, or msec.

Process Pressure High - Sets high pressure alarm set point

Process Pressure Low - Sets low pressure alarm set point

NOTE

Process will be stopped if either high pressure or low pressure set point is exceeded.

Beam Ignition Required - Leave checked at all times. This is an optimization feature.

ELLIPSOMETER

This panel (Figure 4-11) controls functions of the ellipsometer.

Mode

Off - Ellipsometer not used

Monitor - Sets ellipsometer for data collection (enabled only if *Time* or *End by Source Temperature* is selected from the Process Ends By drop-down menu)

Control - Sets ellipsometer to end process by endpoint (enabled only if *Endpoint* is selected in the Process Ends By drop-down menu)

Model - Enter script (model) name

Points - Allows user to add number of measurement points

Thickness - Allows user to add thickness (angstroms)