##### Flow chart description

###### Start

At the start of flow chart, the system has two operational modes:

* Auto Mode
* Manual Mode

###### Auto mode

The auto mode is for automated processing in which the user selects the processes to run and does not need to change the pre-defined parameters. It is further divided into two modes:

* Auto scheduled mode
* Auto processed mode

**Auto scheduled mode**

In this mode, the user sets the date and time to run the specific process only when scheduled time is achieved. The system checks the following logic to run any process:

* **If pasteurization is enabled** → Run at scheduled time
* **If water drain is enabled** → Run at scheduled time
* **If water refill is enabled** → Run at scheduled time
* **If cooling is enabled** → Run at scheduled time
* **If cheese making is enabled** → Run at scheduled time
* **If cheese drainage is enabled** → Run at scheduled time

**Auto process mode**

This mode allows the user to execute individual processes immediately using predefined and fixed parameters. User selects one process to run now and after its execution, the system returns to menu to select another process from the following:

* **Pasteurization**
* **Water Drain**
* **Water Refill**
* **Cooling**
* **Cheese Making**
* **Cheese Drain**

**For cheese making process, the system allows the user to choose from the different types of cheeses. As the specific cheese type is selected, the system loads the predefined parameters for that type from the system’s memory.**

###### Manual mode

In this mode, the user has custom control over each process. Parameters can be adjusted before executing the process. Following are some processes that can be manually controlled:

1. **Pasteurization**

* If the user selects pasteurization → **Yes** (means wants to change the parameters), user is asked to define the following parameters:
* Set the temperature threshold for heating
* Turn the temperature regulation on/off
* Set the temperature holding time in minutes
* Stirring direction for heating and holding
* Stirring speed for heating and holding

After pressing Save button, user presses the Run button to execute the process according to custom defined parameters.

* If **No**, the user presses the Run button to execute the process based on previously defined parameters.

1. **Cooling**

* If the user selects cooling → **Yes**, the user is asked to define the following parameter:
  + Set the target temperature for cooling

After pressing the Save button, user presses the Run button to execute the process according to custom defined parameters.

* If **No**, the user presses the Run button to execute the process based on previously defined parameters.

1. **Cheese Setting**

* If the user selects Cheese Setting → **Yes** (means wants to change the parameters), user is asked to define the following parameters:
* Set the temperature threshold for heating
* Turn the temperature regulation on/off
* Set the temperature holding time in minutes
* Stirring direction for heating and holding
* Stirring speed for heating and holding

After pressing Save button, user presses the Run button to execute the process according to custom defined parameters.

* If **No**, the user presses the Run button to execute the process based on previously defined parameters.

1. **Cheese Drainage**

When the user selects the cheese drainage, the system processes like stirring, heating etc. are shut down and manual drain valve is opened.

1. **Water Drain**

If the user presses the water drainage button, the pneumatic drainage valve is opened and water drains.

1. **Water Refill**

If the user presses the water refill button, the pneumatic refill valve is opened and water is filled into the walls of vat.

###### Cheese types and their parameters

The following values can be used in manual mode or pre-programmed in the recipe settings in auto mode.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cheese Type** | **Pasteurization Temp** | **Holding Time** | **Stirring Speed** | **Stirring Direction** | **Cooling Req** |
| **Cheddar** | 63°C (145°F) | 30 min | Medium | Alternate | Yes |
| **Mozzarella** | 63°C (145°F) | 30 min | High | Clockwise | Yes |
| **Ricotta** | 85–90°C | None | Low | Clockwise | No |
| **Feta** | 72°C | 15 min | Low | Anti-clockwise | Yes |
| **Parmesan** | 63°C | 30 min | Medium | Alternate | Yes |
| **Paneer** | 85°C | 5–10 min | None | None | Optional |
| **Blue Cheese** | 63°C | 30 min | Gentle stir | Clockwise | Yes |

###### Modes comparison table

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **Manual Mode** | **Auto Process Mode** | **Auto Scheduled Mode** |
| Parameter Control | Fully editable by user | Fixed | Fixed |
| Cheese Type Selection | Editable parameters | Selectable | Selectable |
| Process Execution | User-initiated step-by-step | User selects and runs one process at a time | System runs processes automatically at set times and dates |
| Execution Trigger | Manual start | Manual selection | RTC-based automatic start |
| User Supervision | High | Moderate | Minimal |
| Best Use Case | R&D, Customization | Controlled semi-automated runs | Fully automated production |