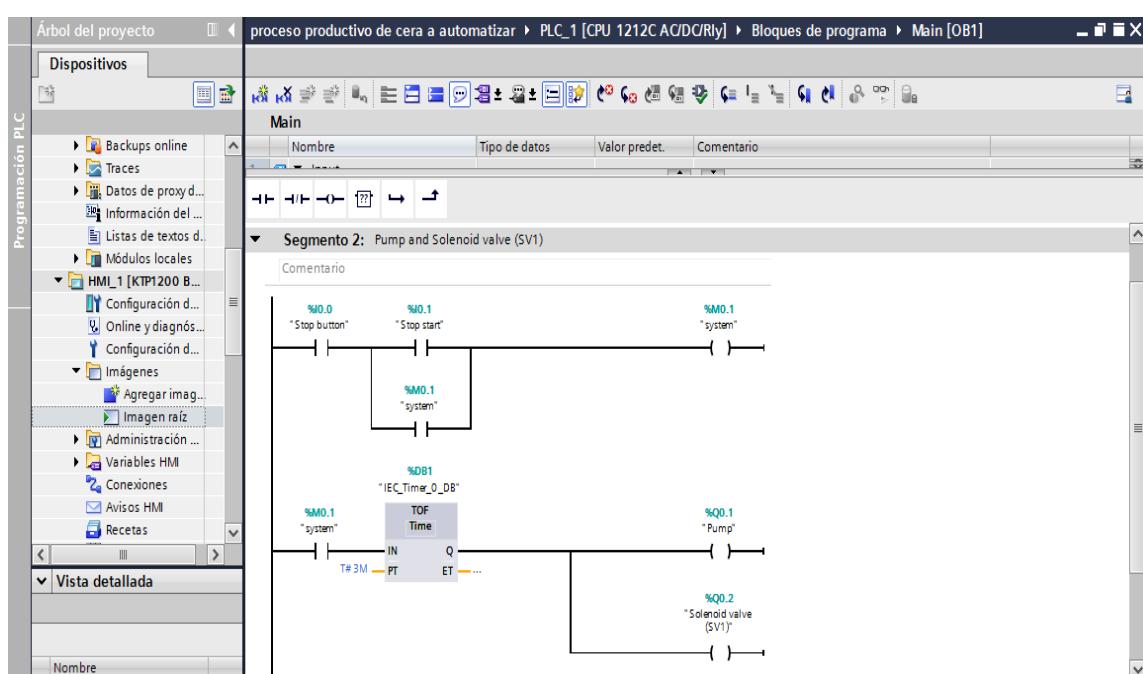
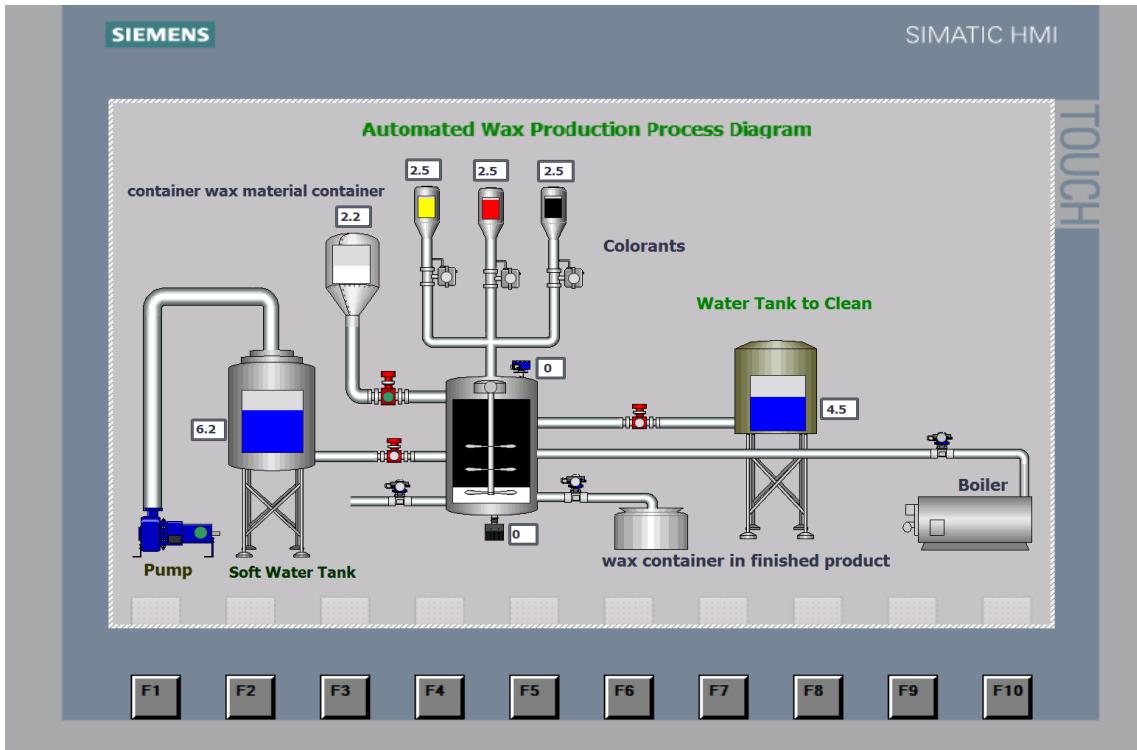


Controller and HMI Interface Programming

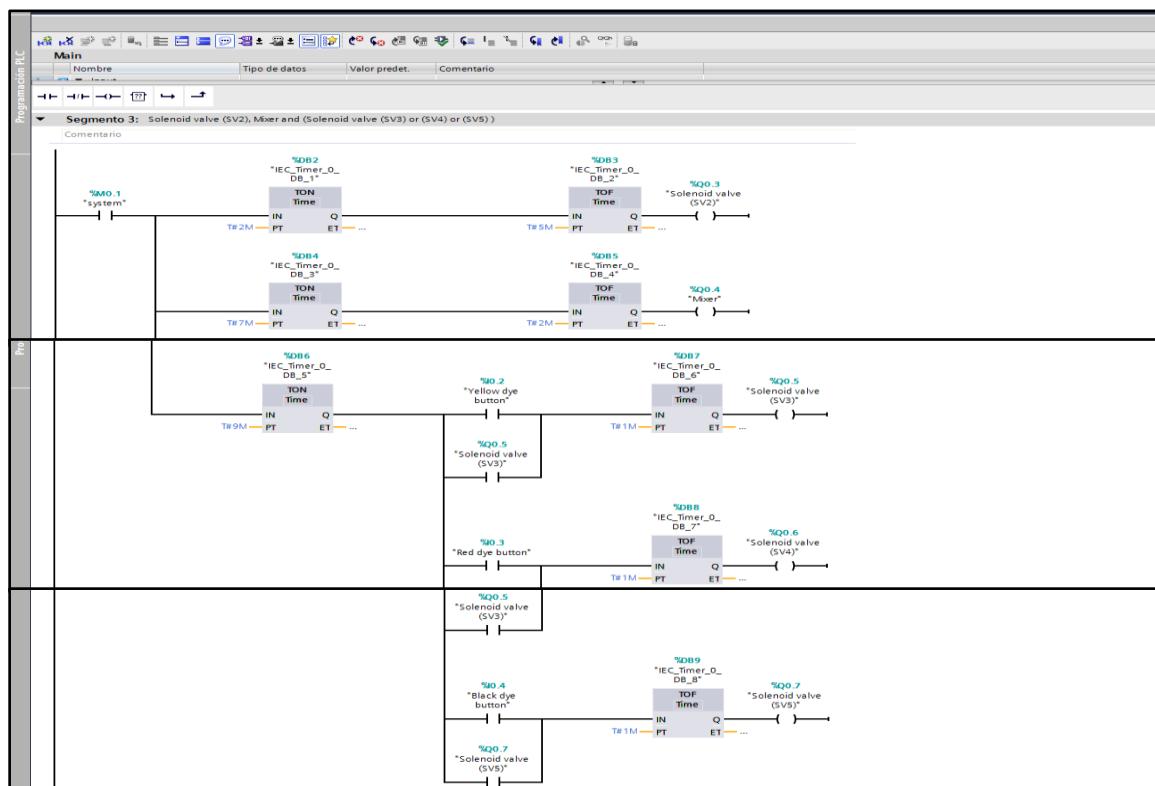
Initially, when the start button is pressed, the system mark will be activated, which will pass the 3HP pump (Q01), for a time of 3 minutes, which will drive the paste wax, stored in the wax container, towards the Semi Batch reactor. At the same moment the pump is activated, the solenoid valve 1 Q0.2 (SV1) will also be activated, the same one that will pass so that the paste wax reaches the Semi Batch reactor. This time will be controlled by the TOF - DB1 timer.



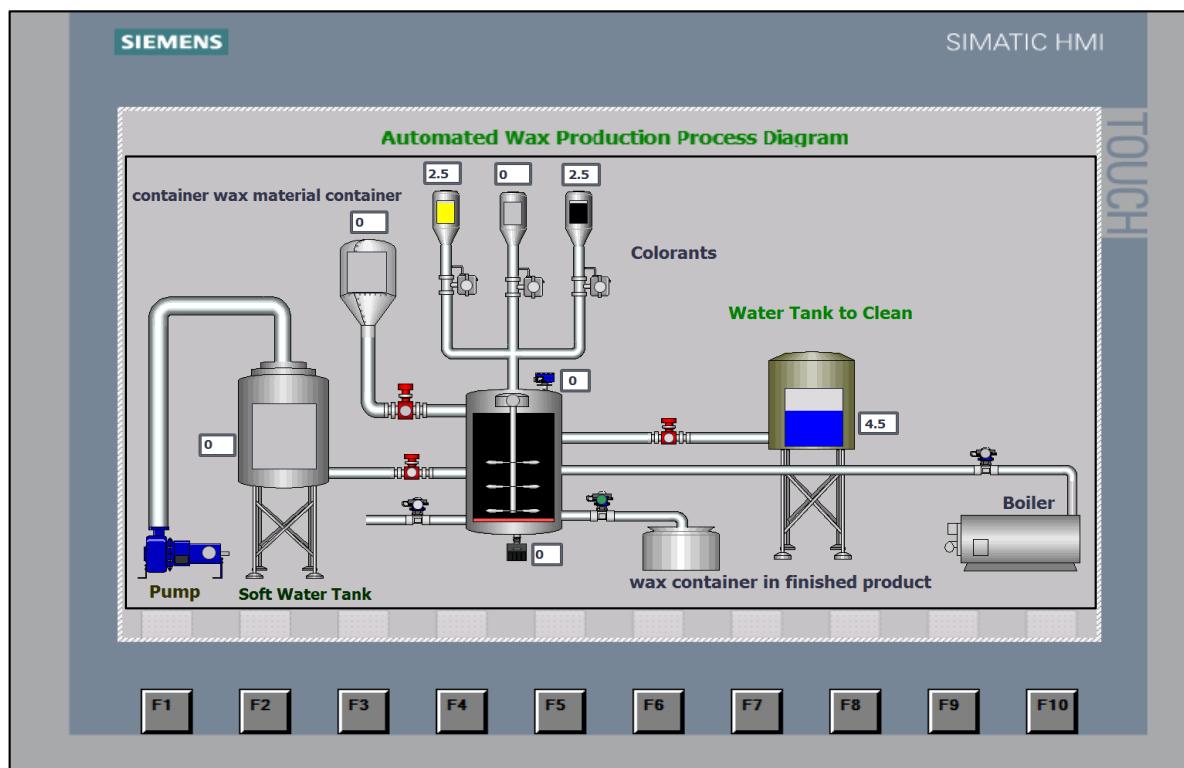
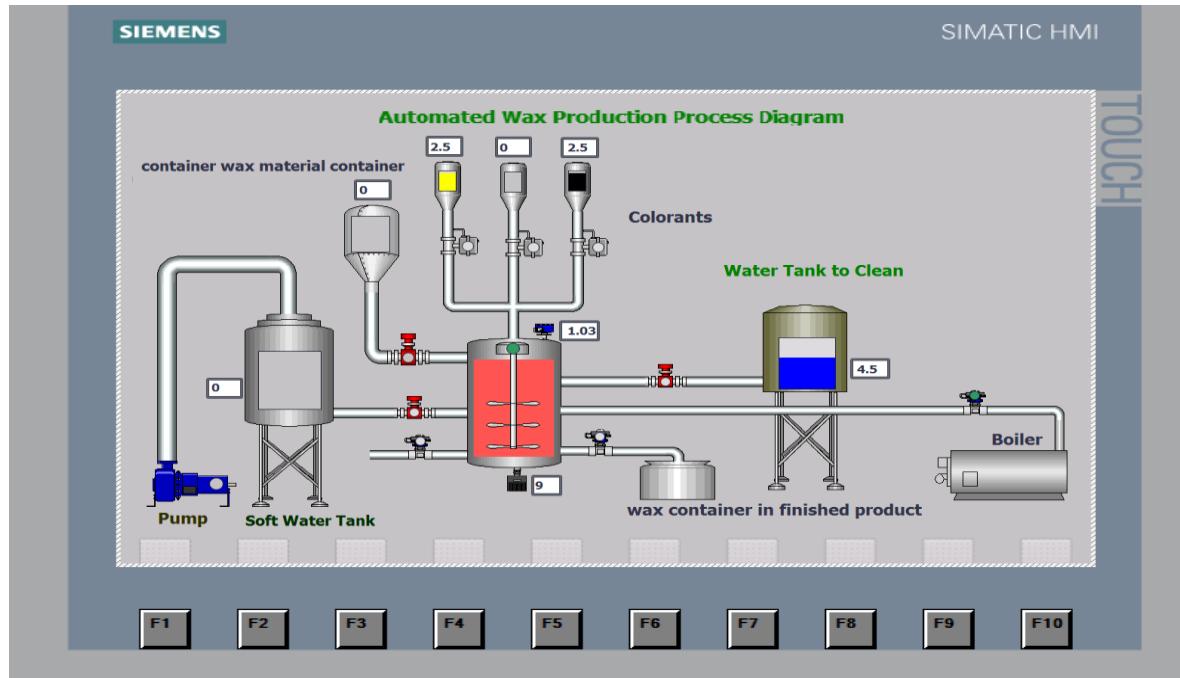
After 2 minutes elapse, it is controlled by the TON-DB2 timer, the solenoid valve 2 Q0.3 (SV2) opens, which will pass the solvent (soft water) to the rector; This stage has a duration of 5 min, this time will be controlled by the TOF - DB3 timer.

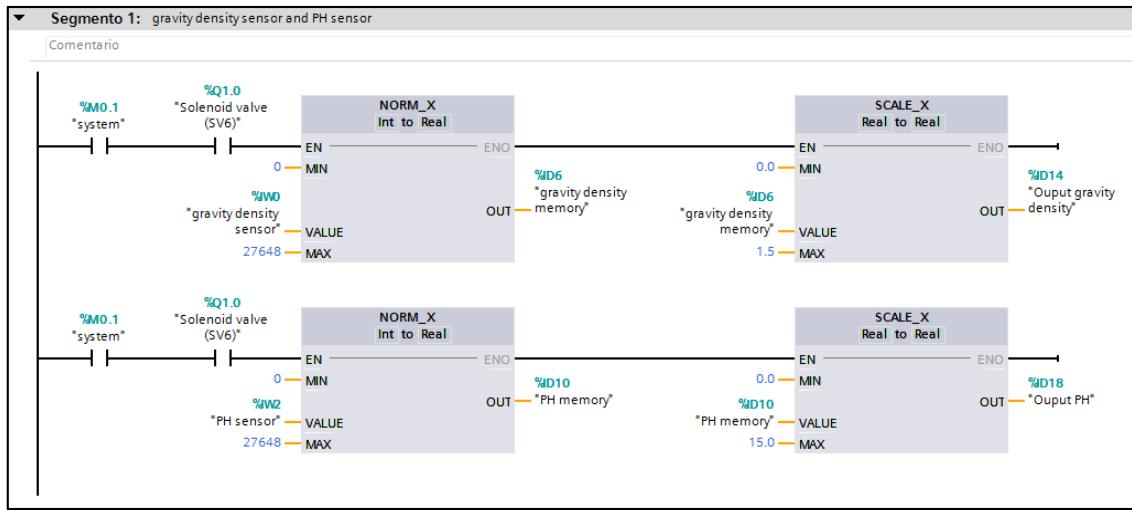
Once these inputs have been entered, the electric stirrer Q0.4 of the reactor will be activated, which will start the mixing stage, for a time of 2 minutes, this time will be controlled by the TOF-DB5 timer. (It is specified that the TON-DB4 timer is used with a time of 7 minutes, whose value is obtained from the sum of TON DB2 and TOF-DB3)

After stopping the operation of the Q0.4 agitator, the colorant will enter, which may well be yellow, red or black, whose storage tanks are each controlled by a button (I0.2-yellow button, I0.3- red pushbutton, 0.4-black pushbutton) so when activating the electrovalve-Q0.5 (SV3), the yellow colorant will be entered, when activating the electrovalve-Q0.6 (SV4), the red colorant will be entered, or the activate the solenoid valve-Q0.7 (SV5), the black colorant will enter. This stage lasts 1 minute; this time will also be controlled by the Timers TOF-DB7 (yellow colorant), TOF-DB8 (red colorant), TOF-DB9 (black colorant). The TON-DB6 timer with a time of 9 minutes comes from the sum of TON DB4 and TOF-DB5.

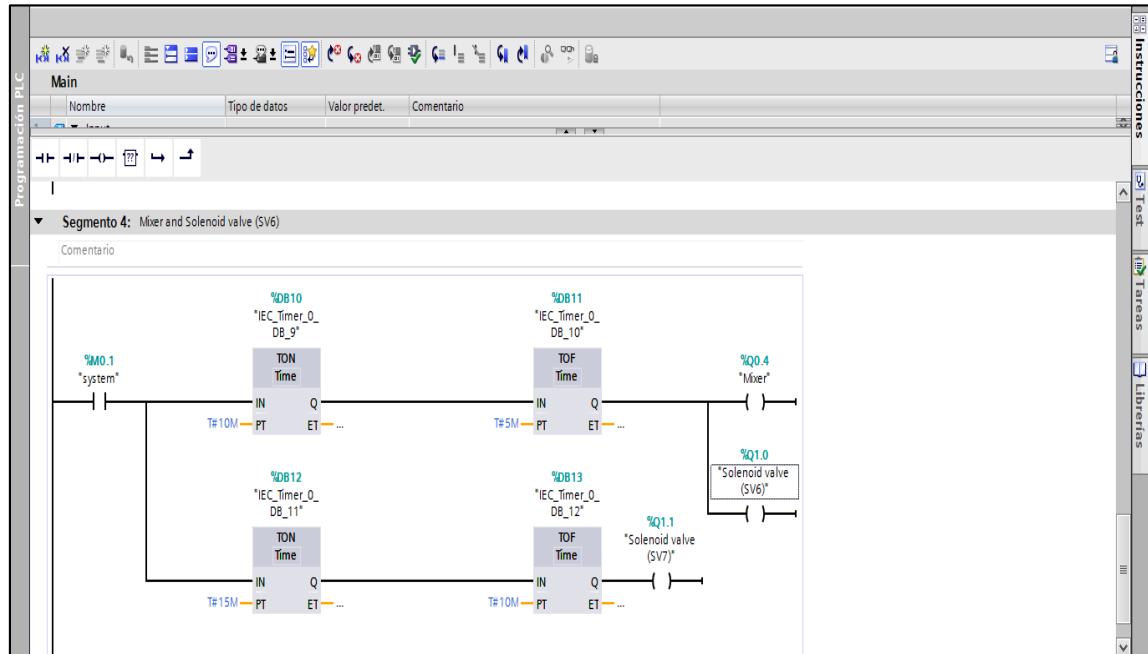


Once all the inputs have been deposited, the electric stirrer Q0.4 will be activated again, in turn the steam valve (SV6) - Q1.0 is opened, which will transfer heat at a temperature of 35 ° C, by means of a boiler, this stage lasts 5 minutes; this time will be controlled by the timer TOF - DB 11. The timer TON-DB10 with a time of 10 minutes comes from the sum of TON DB6 and any tempo TOF-DB7, TOF-DB8, TOF-DB9.



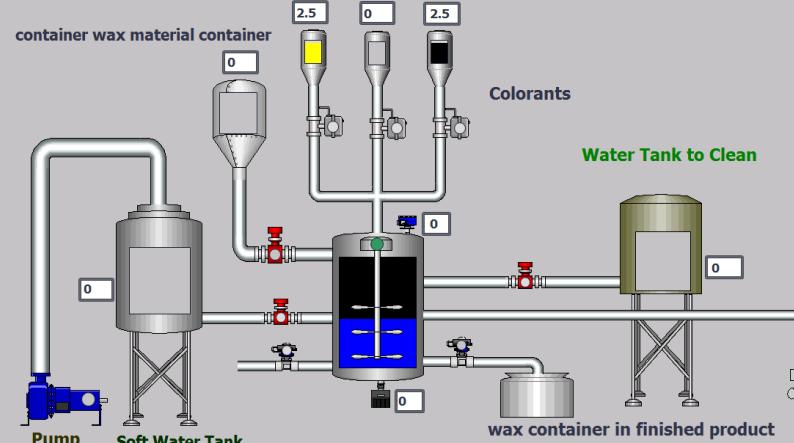


When opening the steam valve (SV6) - Q1.0, gravity density sensors with IW0 input, PH sensor with IW2 input, a normalization of 0-27648 (digitization) is performed for both sensors; for the gravity density sensor it is scaled from 0-1.5 g / ml with ID14 output, the PH sensor is scaled from 0-15 with ID18 output. In order to capture your measurements in the scada.



Once the mixing stage is finished, the drain solenoid valve (SV7) - Q1.1 is opened for 10 min, this is where the finished product is stored in the wax container, and then goes to the packaging stage, this time will be controlled by timer TOF DB13. The TON-DB12 timer with a time of 15 minutes comes from the sum of TON-DB10 and TOF-DB11.

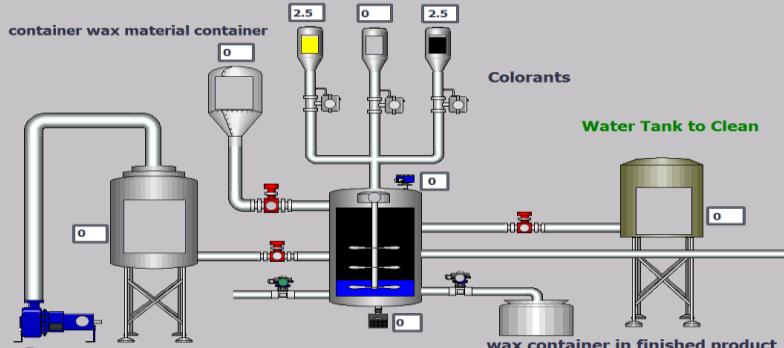
Automated Wax Production Process Diagram



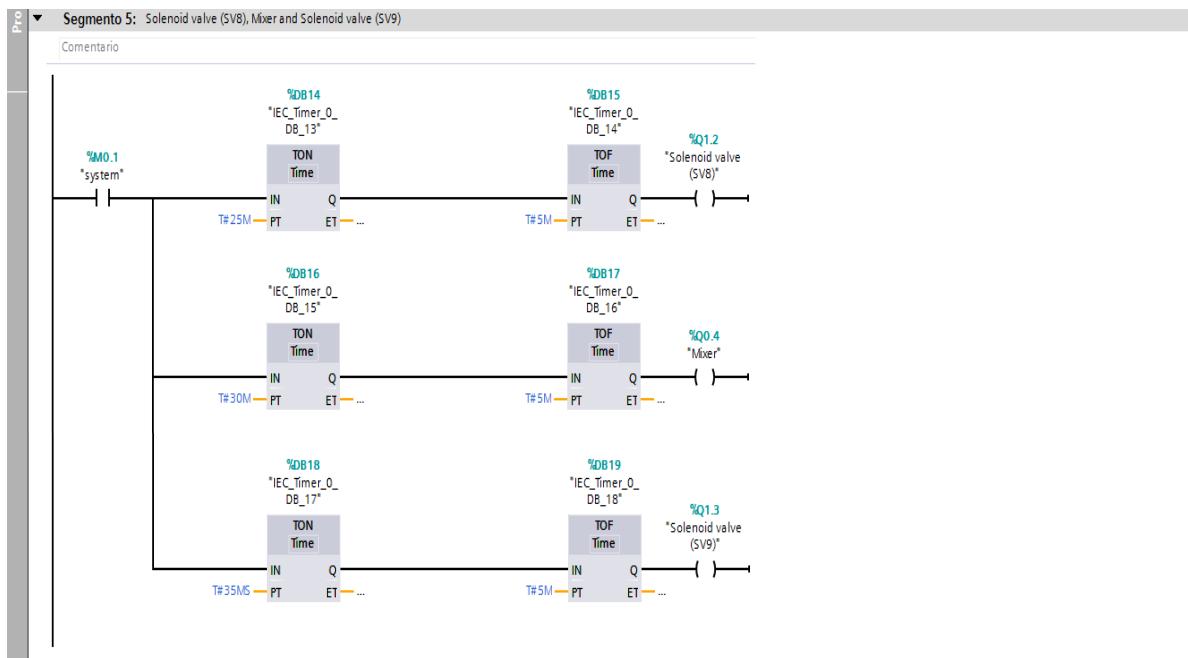
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10

Finally, after 10 minutes elapse, the cleaning stage of the Semi Batch reactor is carried out; In this stage, the SV8-Q1.2 solenoid valve is actuated for a time of 5 minutes, which will enter the soft water, which is stored in a container; this time will be controlled by the timer T0F-DB15 (The timer TON-DB14 is configured with a time of 25 minutes, it comes from the sum of TON-DB12 and TOF-DB13). After the 5 minutes have elapsed, the electric stirrer Q0.4 will be activated, that is where the cleaning stage will proceed, for a time of 5 minutes, this time will be controlled by the TOF-DB17 timer.

Automated Wax Production Process Diagram



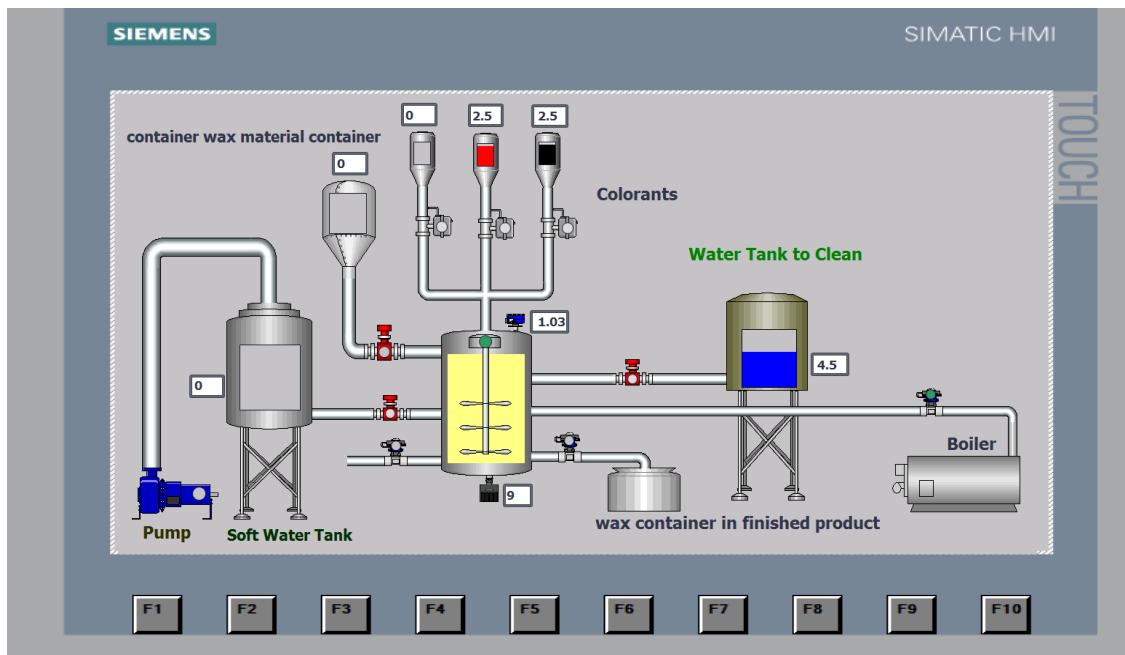
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10



It should be noted that, once this stage is finished, the SV9 - Q1.3 valve is opened for a period of 5 minutes, which will allow this water to be deposited into a storage tank for subsequent residual treatment, this time it will be controlled by timer TOF - DB19.

YELLOW COLOR

Once all the inputs have been deposited, the electric stirrer Q0.4 will be activated again, in turn the steam valve (SV6)-Q1.0 is opened, which will transfer heat at a temperature of 35 ° C, by means of a boiler, this stage lasts 5 minutes; this time will be controlled by the TOF-DB 11 timer.



COLOR BLACK

Once all the inputs have been deposited, the electric stirrer Q0.4 will be activated again, in turn the steam valve (SV6) - Q1.0 is opened, which will transfer heat at a temperature of 35 ° C, by means of a boiler, this stage lasts 5 min; this time will be controlled by the TOF-DB 11 timer.

