Industrial Blending Process

Describing:

**Area 1:**
- The pipe is equipped with an inlet and a feed valve, feed pump and flow sensor.
- Turning on the feed pump must be interlocked when the tank level sensor indicates that the tank is full and the drain valve is open.
• The inlet and feed valves must be opened at the earliest 1 second after starting the feed pump.
• The valves must be closed immediately after the feed pump stops (signal from the flow sensor) to prevent ingredients leaking from the pump.
• The activation of the feed pump is combined with a time monitoring function, in other words, within 7 seconds after the pumps start, the flow sensor must report a flow.
• The feed pump must be turned off as quickly as possible if the flow sensor no longer signals a flow while the feed pumps are running.
• The number of times that the feed pump are started must be counted (maintenance interval).

Area 2:
• The activation of the agitator motor must be interlocked when the tank level sensor indicates that the tank is empty or the drain valve is open.
• The agitator motor sends a response signal after reaching the rated speed. If this signal is not received within 10 seconds after the motor is activated, the motor must be turned off.
• The number of times that the agitator motor starts must be counted (maintenance interval).
• Two sensors must be installed in the mixing tank:
  o Full sensor: a normally closed contact. When the maximum tank level is reached, the contact is opened.
  o Empty sensor: a normally open contact. If the tank is not empty, the contact is closed.
Area 3:

- Drainage of the tank is controlled by a solenoid valve.
- The solenoid valve is controlled by the operator, but must be closed again when the "Empty sensor" signal is generated.
- Opening the drain valve is interlocked when:
  - the agitator motor is running
  - the tank is empty.

Operator Station:

The operator station is equipped with the following:

- Pushbuttons to:
  - Start, stop feed pump.
  - Start, stop agitator.
  - Open, close drain.
  - Turn off the maintenance display lamps for the motors due for maintenance and reset the corresponding counters for the maintenance interval to 0.

- Display lamps to indicate the status of the process:
  - Start, stop feed pump.
  - Start, stop agitator.
  - Open, close drain
  - Maintain feed pump, agitator.
  - Tank level.

- The emergency stop switch.
Robot movement control

This kind of robot is seen in many automated factories. Robot picks up a work being carried on conveyor A and places it on conveyor B. The operations and conditions are as follows:

- When the start button is pressed, the robot rotates its arm clockwise.
- When the robot arm has moved to the position of the work on the conveyor A, arm grasps the work.
- When the arm has grasped the work, it rotates counterclockwise.
- When the arm has rotated to the position of conveyor B, it releases the work.