Name: _____   **Date: ____ _____ _____**

                                                                   Year   Month   Day

**LAB 3 – Purposes: The student will learn to:**

1. Edit an existing Scene in FactoryIO
2. Network multiple PLC's together (max two for this Lab).
3. Become familiar with the concepts of Interlocking
4. Utilize a form of Part Detection to ensure correct Assembly and transfer to next machine
5. Edit the Automatic PLC program from Lab2 to create addition functions without altering the manual requirements from Lab2 (this may include expanding Inputs & Outputs) [1]
6. Work together in teams to create a simulated factory environment.

Deliverables:

*   Simple report of your design submitted as a team of two and create any notes required to implement these changes. Include some of the Ladder you created for interlocking.
*   Successful demonstration of the interlocked factory running correctly.
*   Successful demonstration of error proofing (ie: wrong base or lid is delivered).
*   Copy of Report, PLC Code AND Factory Uploaded to _____.

Specifications:

*   Create two PLC Programs to Move Parts from one simulation to another.
*   Load the Scene and PLC Code from Lab 2 and then save each as Lab 3.
*   PLC program re-use is up to the programmer.
*   Modify Lab 3 to include 2 feed and 2 removal conveyors. These conveyors are being added to reduce the clutter in the simulation but can be treated a one long conveyor so as to not create the need for extra manual functions).
*   Add Vision Sensors to each lane. Manual controls of these sensors are not required.
*   Add Lights to your existing panel to show:
    o Valid Part at Camera (2)
    o Part in Place ready to Assemble (1)
*   Trade the correct part information to form the basis for the interlock shown below.
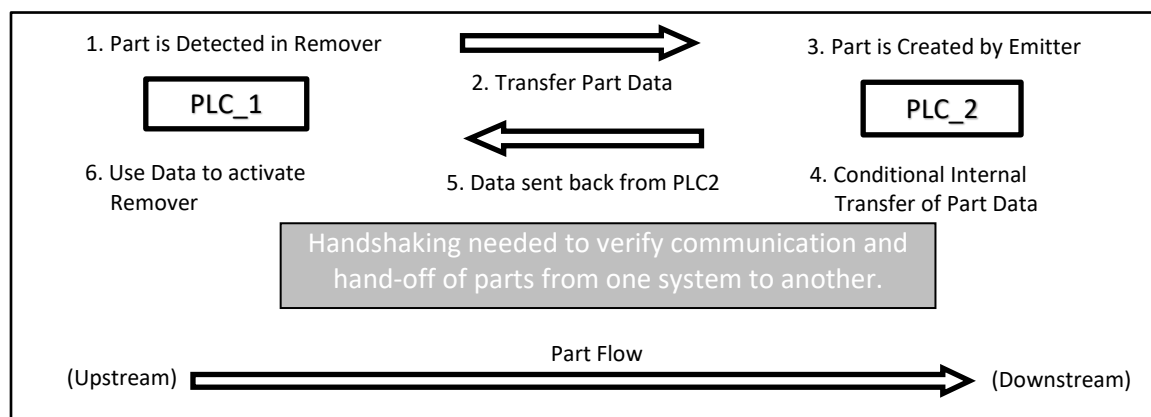
Network two PLCs to create two Interdependent Assembly Operations
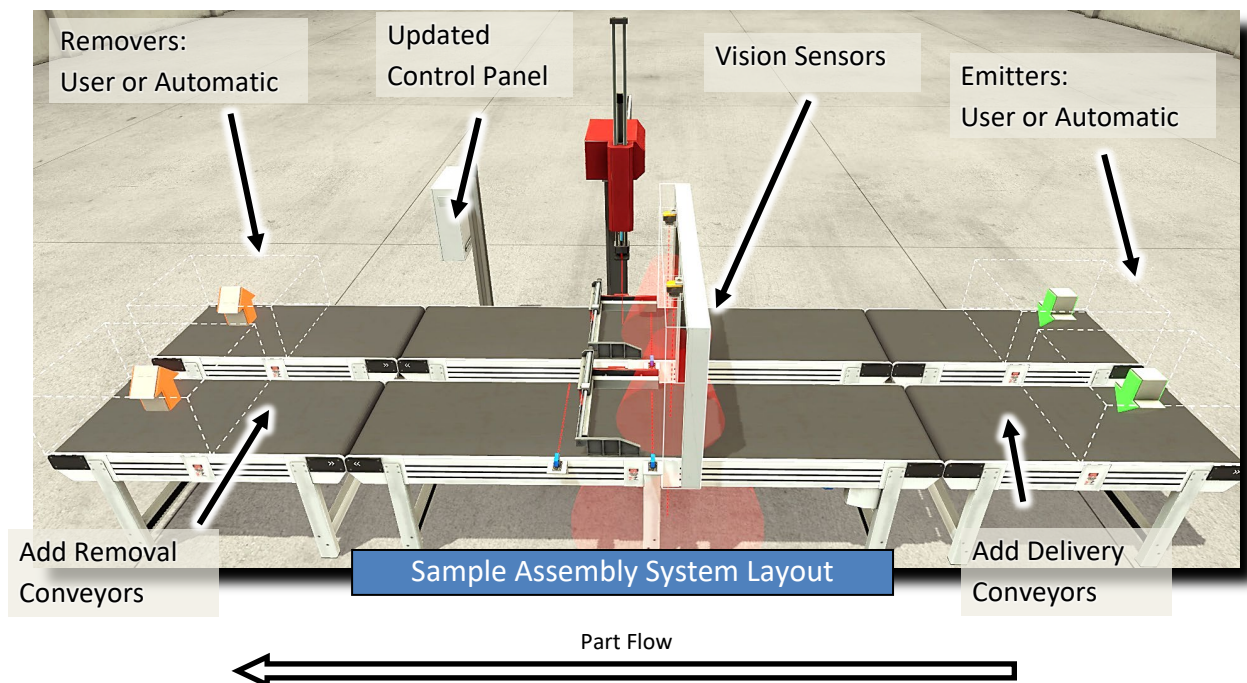

PLC_1 (Blue Machine – Upstream)

- Emitter in Automatic mode creating Blue and Green Lids with the similar timing setting as the original prebuilt scene. Emitters can be forced ON or PLC controlled.
- Add Cameras to test Bases and Lids as shown. Use the "All Numerical" option as the output from the Camera.
- Use the Vision Sensor Output to ensure only Blue Assemblies are created … bypass Green.
- Green Bases and Lids will be sent to their respective Removers and data transferred to PLC_2
- Green Bases and Lids will only be Dissolved when PLC_2 acknowledge receipt of Data
  (ie: transferred the receive data back to the originating PLC).
- Blue Assemblies must be diverted by turning on the Remover but NOT transferring any data to PLC_2. (conceptually, a real finished assembly would be removed by another method)
- Fully Document your code with proper Tags and Comments

PLC_2 (Green Machine – Downstream)

- Emitter in Manual. Creates Lid or Base (Blue or Green) depending on Data send by PLC_1
- Once data is received and items is created, send the value back to PLC_1 as an acknowledgement of received of data. (how to verify item has been created?)
- Add Cameras to test Bases and Lids as shown. Use the "All Numerical" option as the output from the Camera.
- Use the Vision Sensor Output to ensure only Green Assemblies are created … bypass Blue.
- Any Errant Blue Bases and Lids will be sent directly to their respective Removers (bypassing the positioner).
- Green Assemblies must be diverted by turning on the Remover
- Fully Document your code.

Removers:
User or Automatic

Updated
Control Panel

Vision Sensors

Emitters:
User or Automatic

Add Removal
Conveyors

Sample Assembly System Layout

Add Delivery
Conveyors

Part Flow

Notes:

- You may remove the guarding to make it easy to work with the simulation.
- Use the same pushbutton panel from Previous Lab - edit as needed.
- Expand addressing to handing the additional Inputs and Outputs
- Although we will start Siemens programming after Reading week, this Lab is Due at the Beginning of your Lab during Week 10 (Week of 08Mar20).

Suggestions and Tips:

- Expand your IO Configuration to 45 Boolean Inputs, 45 Boolean Outputs, 6 INT Inputs and 6 INT Outputs
- Start by adding all the equipment required
    - Additional conveyors
    - Vision Sensors
    - Remover Configuration (for PLC1)
    - Emitter Configuration (for PLC2)
- Add all tags required
- Cream some additional routines to help in setup and testing
    - Add a Routine for Vision Detection and set a bit for each part type.
    - Add a Routine for Emitter or Remover Control
    - Create a bypass to Route Detected Parts/Bases back to Remove Parts/Bases (PLC1)
    - Create a bypass to Generate Blue or Green Parts or Bases as needed (PLC2)
    - Run your program in manual with Clamps Raised to watch your Vision, Emitters and Removers function.
- Add in the Vision verification programming and test (you may with the turn the emitted on only when no parts are on the conveyor for now.)
- Finally, add in our PLC – PLC communication and tie into your functioning program