Set output signals and inner tags to inital states

0   Mode_Auto   HMI_Mode.4

Part in transit
from hold back to
robot stop
Cell_1.PartEntering
(U)

Pick from Conveyor
and drop on CNC 2
DI[1]
Fanuc_Rbt_C1:O.
Data[0].0
(U)

Pick from Conveyor
and drop on CNC 1
DI[2]
Fanuc_Rbt_C1:O.
Data[0].1
(U)

Pick from CNC2 and
Drop on conveyor
DI[3]
Fanuc_Rbt_C1:O.
Data[0].2
(U)

Pick from CNC1 and
Drop on conveyor
DI[4]
Fanuc_Rbt_C1:O.
Data[0].3
(U)

Flip part to machine
top of cabin/trunk
DI[5]
Fanuc_Rbt_C1:O.
Data[0].4
(U)

R1J_Read_Finished
(U)

CNC 1 has completed
cutting the part
CNC_1_Done
(U)

CNC 2 has completed
cutting the part
CNC_2_Done
(U)

Let all pallets (empty and full) through to Cell 1 Hold Back stopper.

Rung 1

Mode_Start
Mode_Semi

Sensor Pallet Stop
RFID4 (Loop 1
Diverter Hold Back
Stop)
PPX4
<Conv_N053:I.Data[3].2>

DeBounceC23DivHoldBack.TT

TON—
Timer On Delay   —(EN)
Timer   DeBounceC23DivHoldBack
                        —(DN)—
Preset   1000
Accum   0

Rung 2

Mode_Auto
Mode_Semi

DeBounceC23DivHoldBack.TT

Retract Stop
C23DivHoldBack.Ret
—(L)—

Extend Stop
C23DivHoldBack.Ext
—(U)—

Rung 3

Mode_Auto
Mode_Semi

DeBounceC23DivHoldBack.TT
—]/[—

Retract Stop
C23DivHoldBack.Ret
—(U)—

Extend Stop
C23DivHoldBack.Ext
—(L)—

If there is a part at Cell 1 Hold Back Stop (which is sensed by the proximity sensor), and their is not a part in transit to enter cell 1 (which is determined by Cell_1.PartEntering boolean, which is set to true when the pallet leaves the hold back, and set to false when it is sensed by the proximity sensor in Cell 1), then begin the Debounce1 timer. The timer ensures that noice at PPX5 won't affect the program.

Rung 4

Mode_Start
Mode_Semi

Sensor Pallet Stop
(Cell 1 Hold Back)
PPX5
<Main_N043:I.Data[3].0>

RFID Tag at Cell 1
Stop
RFIDTP1
<RFID_N054:I.Channel[0].TagPresent>

RFID Tag at Cell 1
Stop
RFIDTP1
<RFID_N054:I.Channel[0].TagPresent>
—]/[—

R1J_Read_Finished

Part in transit
from hold back to
robot stop
Cell_1.PartEntering
—]/[—

TON—
Timer On Delay   —(EN)
Timer   DeBounce1
Preset   250   —(DN)—
Accum   0

When Mode_Auto and Dry_Cycle are activated, and the DeBounce1 timer is done, and the Cell 1 Hold Back Stop is extended, and there is not a pallet at the pallet stop in Cell 1, and there is not a part in transit to cell 1, then begin the timer RelC1HoldBack, and allow this timer to completly run.

Rung 5

Mode_Start
Mode_Semi

DeBounce1.DN

RelC1HoldBack.TT

Cell 1 Hold Back
Stop Extended
Manifold_N058:1
:O.Pt00Data

Sensor Palet Stop
RFID1 (Cell 1 Fanuc
Robot Stop)
PPX1
<C1_N011:I.Data[6].7>
—]/[—

Part in transit
from hold back to
robot stop
Cell_1.PartEntering
—]/[—

TON—
Timer On Delay   —(EN)
Timer   RelC1HoldBack
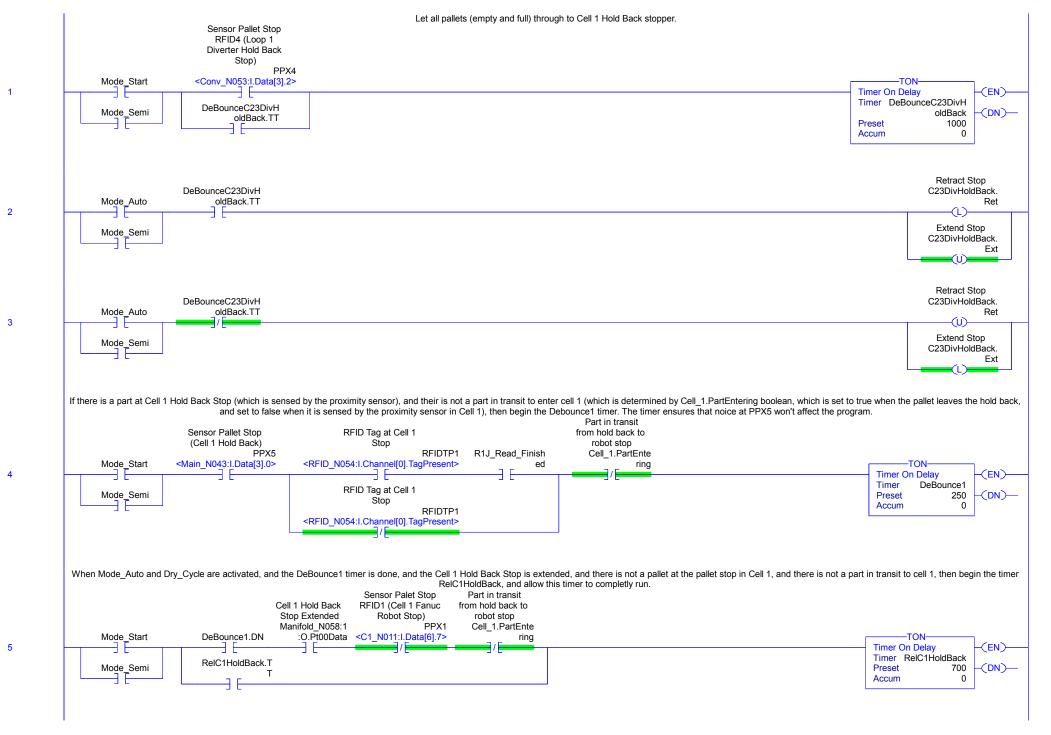Preset   700   —(DN)—
Accum   0

Cell_1_ZZ - Ladder Diagram   **Page 3**
AdvManLab:MainTask:MainProgram   11/9/2017 3:50:31 PM
Total number of rungs in routine: 20   C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD

Rung 6

Mode_Auto — RelC1HoldBack.T.T

Mode_Semi

Retract Stop — C1HoldBack.Ret (L)

Extend Stop — C1HoldBack.Ext (U)

Part in transit from hold back to robot stop — Cell_1.PartEntering (L)

Rung 7

Mode_Auto — RelC1HoldBack.T.T (/)

Mode_Semi

Retract Stop — C1HoldBack.Ret (U)

Extend Stop — C1HoldBack.Ext (L)

When the pallet arrives at Cell 1 Fanuc Robot Stop, begin the DeBounce2 timer.

Rung 8

Mode_Start — Sensor Palet Stop RFID1 (Cell 1 Fanuc Robot Stop) PPX1 <C1_N011:I.Data[6].7>

Mode_Semi

TON
Timer On Delay   (EN)
Timer   DeBounce2
Preset   250   (DN)
Accum   0

Cell_1_ZZ - Ladder Diagram   **Page 4**

AdvManLab:MainTask:MainProgram   11/9/2017 3:50:31 PM

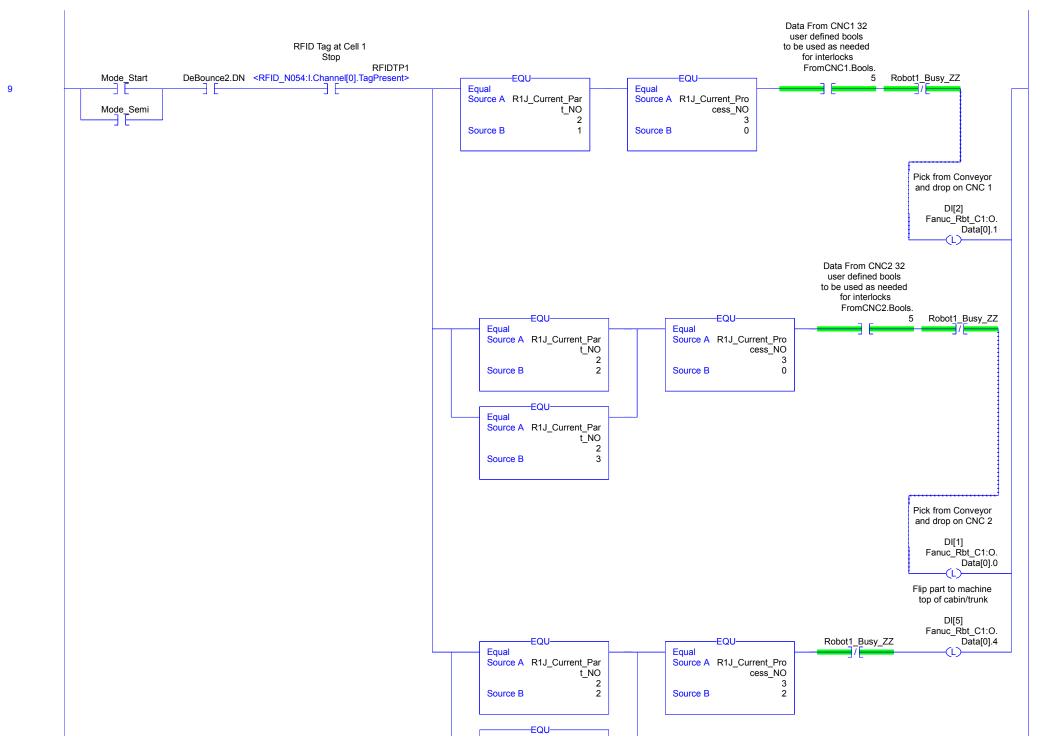Total number of rungs in routine: 20   C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD

```
                                              RFID Tag at Cell 1
                                              Stop
         Mode_Start      DeBounce2.DN       RFIDTP1
                                            <RFID_N054:I.Channel[0].TagPresent>
9   ─┬──┤ ├──────────────┤ ├──────────────────┤ ├────────┬──
     │                                                    │
     │    Mode_Semi                                       │
     └──┤ ├──┘                                            │
```

Rung 9:

- EQU — Equal: Source A = R1J_Current_Part_NO = 2 ; Source B = 1
- EQU — Equal: Source A = R1J_Current_Process_NO = 3 ; Source B = 0

Data From CNC1 32 user defined bools to be used as needed for interlocks
FromCNC1.Bools. 5

Robot1_Busy_ZZ

Pick from Conveyor and drop on CNC 1
DI[2]
Fanuc_Rbt_C1:O.Data[0].1 (L)

- EQU — Equal: Source A = R1J_Current_Part_NO = 2 ; Source B = 2
- EQU — Equal: Source A = R1J_Current_Part_NO = 2 ; Source B = 3
- EQU — Equal: Source A = R1J_Current_Process_NO = 3 ; Source B = 0

Data From CNC2 32 user defined bools to be used as needed for interlocks
FromCNC2.Bools. 5

Robot1_Busy_ZZ

Pick from Conveyor and drop on CNC 2
DI[1]
Fanuc_Rbt_C1:O.Data[0].0 (L)

Flip part to machine top of cabin/trunk
DI[5]
Fanuc_Rbt_C1:O.Data[0].4 (L)

- EQU — Equal: Source A = R1J_Current_Part_NO = 2 ; Source B = 2
- EQU — Equal: Source A = R1J_Current_Process_NO = 3 ; Source B = 2

Robot1_Busy_ZZ

- EQU — Equal: Source A = R1J_Current_Part_NO = 2 ; Source B = 2

Cell_1_ZZ - Ladder Diagram   **Page 5**
AdvManLab:MainTask:MainProgram   11/9/2017 3:50:31 PM
Total number of rungs in routine: 20   C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD
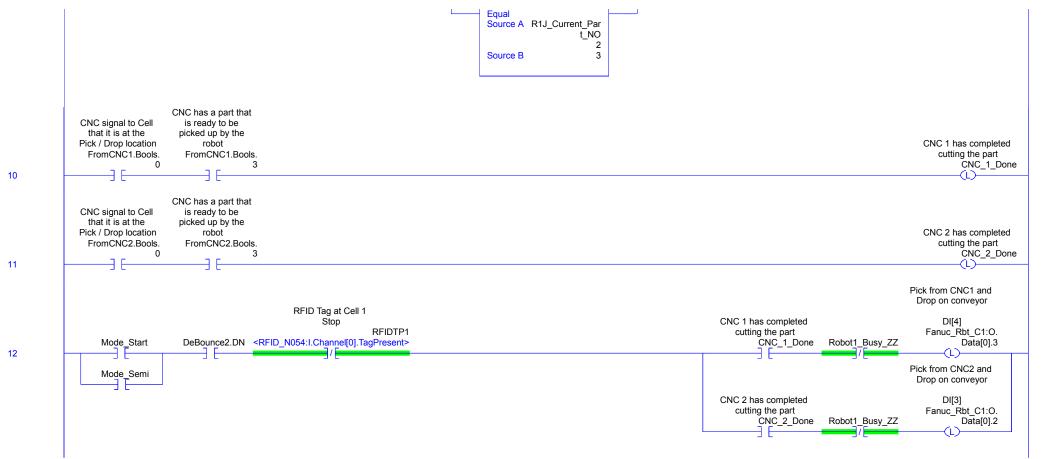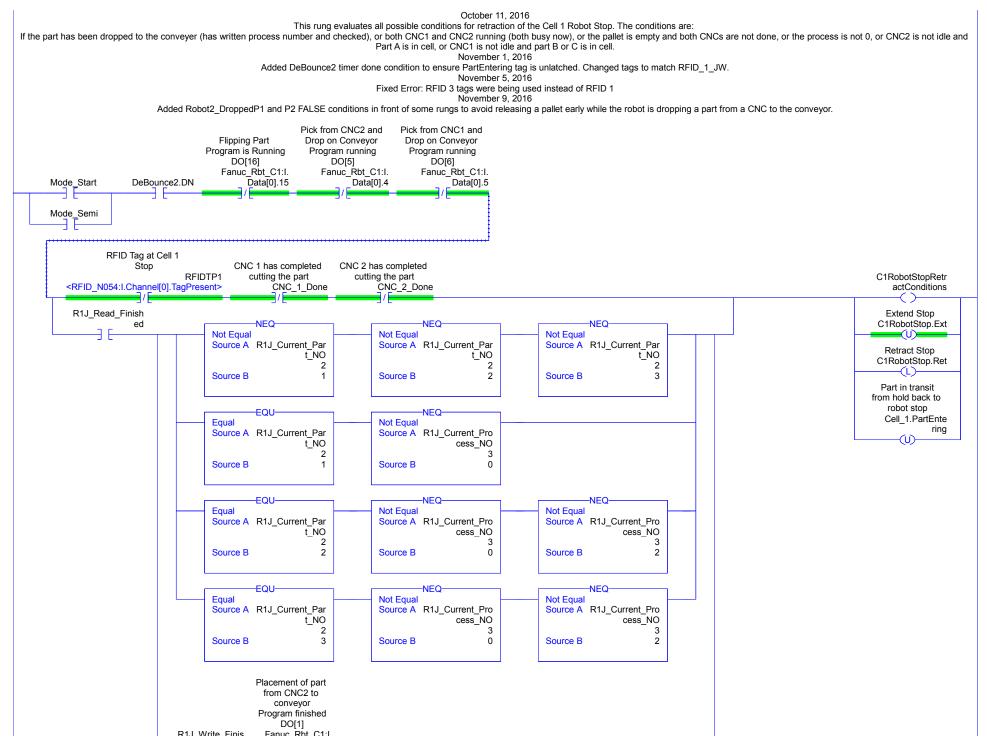
```
                                                    Equal
                                                    Source A    R1J_Current_Par
                                                                        t_NO
                                                                           2
                                                    Source B               3
```

Rung 10:

CNC signal to Cell that it is at the Pick / Drop location — FromCNC1.Bools.0 —] [
CNC has a part that is ready to be picked up by the robot — FromCNC1.Bools.3 —] [
CNC 1 has completed cutting the part — CNC_1_Done — (L)

Rung 11:

CNC signal to Cell that it is at the Pick / Drop location — FromCNC2.Bools.0 —] [
CNC has a part that is ready to be picked up by the robot — FromCNC2.Bools.3 —] [
CNC 2 has completed cutting the part — CNC_2_Done — (L)

Rung 12:

Mode_Start —] [
Mode_Semi —] [
DeBounce2.DN —] [
RFID Tag at Cell 1 Stop — RFIDTP1 — <RFID_N054:I.Channel[0].TagPresent> —]/[

CNC 1 has completed cutting the part — CNC_1_Done —] [— Robot1_Busy_ZZ —]/[— Pick from CNC1 and Drop on conveyor — DI[4] — Fanuc_Rbt_C1:O.Data[0].3 — (L)

CNC 2 has completed cutting the part — CNC_2_Done —] [— Robot1_Busy_ZZ —]/[— Pick from CNC2 and Drop on conveyor — DI[3] — Fanuc_Rbt_C1:O.Data[0].2 — (L)

Cell_1_ZZ - Ladder Diagram   **Page 6**
AdvManLab:MainTask:MainProgram
Total number of rungs in routine: 20   11/9/2017 3:50:31 PM
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October 11, 2016
This rung evaluates all possible conditions for retraction of the Cell 1 Robot Stop. The conditions are:
If the part has been dropped to the conveyer (has written process number and checked), or both CNC1 and CNC2 running (both busy now), or the pallet is empty and both CNCs are not done, or the process is not 0, or CNC2 is not idle and Part A is in cell, or CNC1 is not idle and part B or C is in cell.
November 1, 2016
Added DeBounce2 timer done condition to ensure PartEntering tag is unlatched. Changed tags to match RFID_1_JW.
November 5, 2016
Fixed Error: RFID 3 tags were being used instead of RFID 1
November 9, 2016
Added Robot2_DroppedP1 and P2 FALSE conditions in front of some rungs to avoid releasing a pallet early while the robot is dropping a part from a CNC to the conveyor.

Cell_1_ZZ - Ladder Diagram   **Page 7**
AdvManLab:MainTask:MainProgram
Total number of rungs in routine: 20   11/9/2017 3:50:31 PM
C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD

R1J_Write_Finis hed_Check | Fanuc_Rbt_C1:I. Data[0].0

Placement of part from CNC1 to conveyor Program finished DO[2]
R1J_Write_Finis hed_Check | Fanuc_Rbt_C1:I. Data[0].1

Pallet with Flipped Part can be Let Go DO[17]
R1J_Write_Finis hed_Check | Fanuc_Rbt_C1:I. Data[1].0

Pick from CNC2 and Drop on Conveyor Program running DO[5] Fanuc_Rbt_C1:I. Data[0].4

Pick from CNC1 and Drop on Conveyor Program running DO[6] Fanuc_Rbt_C1:I. Data[0].5

CNC has a part that is ready to be picked up by the robot FromCNC1.Bools. 3

CNC has a part that is ready to be picked up by the robot FromCNC2.Bools. 3

14   Placement of part from CNC2 to conveyor Program finished DO[1] Fanuc_Rbt_C1:I. Data[0].0

CNC 2 has completed cutting the part CNC_2_Done (U)   BobsBits.16 (L)

15   Placement of part from CNC1 to conveyor Program finished DO[2] Fanuc_Rbt_C1:I. Data[0].1

CNC 1 has completed cutting the part CNC_1_Done (U)

16   November 1, 2016
This Timer was added to fix the problem of the Pallet Stop extending too quickly and jamming a pallet that had not yet fully passed the stop.

Mode_Start
Mode_Semi
C1RobotStopRetr actConditions

TON
Timer On Delay   (EN)
Timer   C1RobotStopPall etTransit   (DN)
Preset   500
Accum   0

Cell_1_ZZ - Ladder Diagram   **Page 8**

AdvManLab:MainTask:MainProgram

11/9/2017 3:50:31 PM

Total number of rungs in routine: 20   C:\Users\VRMILLING\Documents\control_team_manuals\Logic W2017\Separate branches\Chris_branch_20171109_1.ACD

October 11, 2016
If the above Retraction conditions are all false, then extend the stop.
November 1, 2016
Timer added.

17

Mode_Start — C1RobotStopRetractConditions / — C1RobotStopPalletTransit.DN
Mode_Semi

Retract Stop
C1RobotStop.Ret (U)

Extend Stop
C1RobotStop.Ext (L)

R1J_Write_Pass (U)

If the C1RobotStop is retract and there is no RFID tags, unlatch the Robot1DroppedPart.
November 1, 2016
Removed RFID Tag not present condition (Stop was extending before part exited RFID field of view)
November 9, 2016
Changed from the retract condition to a Tag Not Present condition to ensure DroppedPart is unlatched even if the robot continues sending DO[11] after the pallet stop is extended again.

18

Mode_Start — DeBounce2.DN / — RFID Tag at Cell 1 Stop RFIDTP1 <RFID_N054:I.Channel[0].TagPresent> /
Mode_Semi

Pick from Conveyor
and drop on CNC 2
DI[1]
Fanuc_Rbt_C1:O.Data[0].0 (U)

Pick from Conveyor
and drop on CNC 1
DI[2]
Fanuc_Rbt_C1:O.Data[0].1 (U)

Pick from CNC2 and
Drop on conveyor
DI[3]
Fanuc_Rbt_C1:O.Data[0].2 (U)

Pick from CNC1 and
Drop on conveyor
DI[4]
Fanuc_Rbt_C1:O.Data[0].3 (U)

Flip part to machine
top of cabin/trunk
DI[5]
Fanuc_Rbt_C1:O.Data[0].4 (U)

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Pick from Conveyor
and Drop on CNC2
Program running
DO[3]
Fanuc_Rbt_C1:I.
Data[0].2

Pick from Conveyor
and Drop on CNC1
Program running
DO[4]
Fanuc_Rbt_C1:I.
Data[0].3

Pick from CNC2 and
Drop on Conveyor
Program running
DO[5]
Fanuc_Rbt_C1:I.
Data[0].4

Pick from CNC1 and
Drop on Conveyor
Program running
DO[6]
Fanuc_Rbt_C1:I.
Data[0].5

Flip Part
Program running
DO[15]
Fanuc_Rbt_C1:I.
Data[0].14

Robot1_Busy_ZZ

(End)