BANNER ⊘ **IO**-Link

Thickness AOI Guide
7/31/2019

This document covers the installation and use of an Add-On Instruction (AOI) for the Logix Designer software package from Rockwell Automation. This AOI uses readings from two sensors to determine the thickness of an object. Each sensor could be an IO-Link version with a Process Data In measurement value or an analog version with a counts, voltage, or current value. The AOI has one User Defined data type.

Components
Banner_Thickness_AOI.L5X
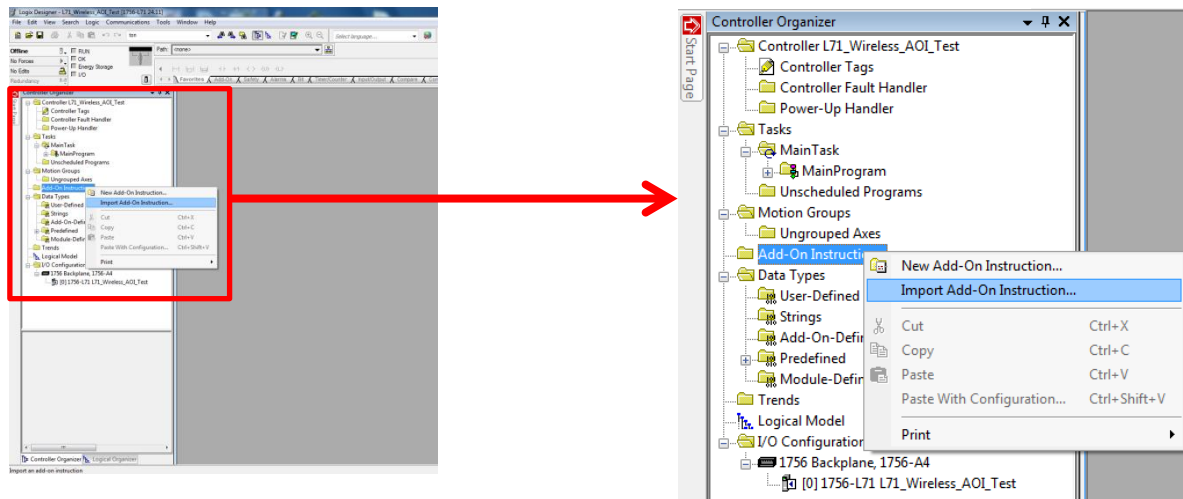
UDT Packaged with the AOI
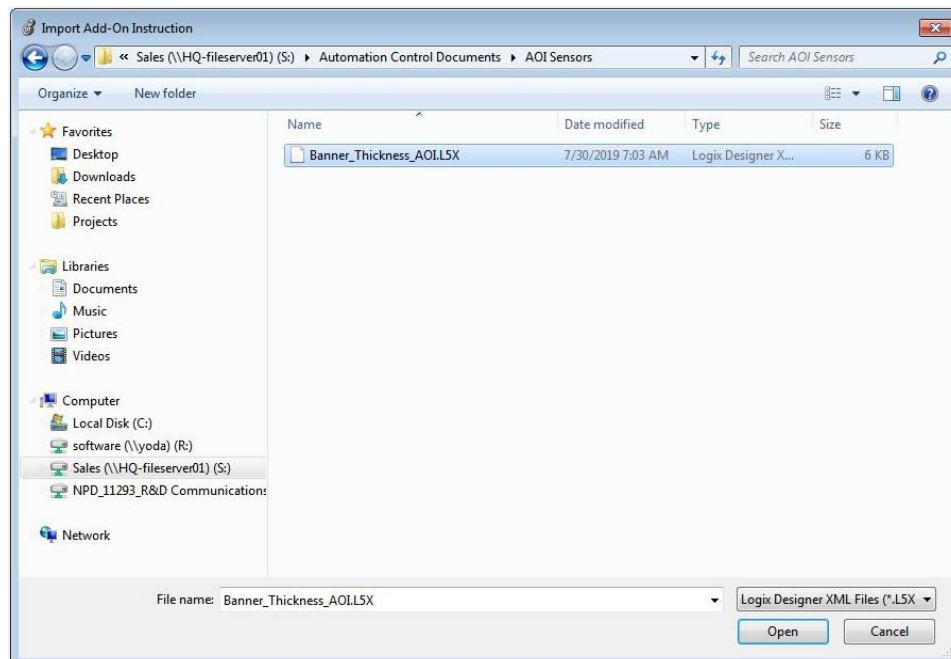Banner_Thickness_Tags

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1.   Installation Process

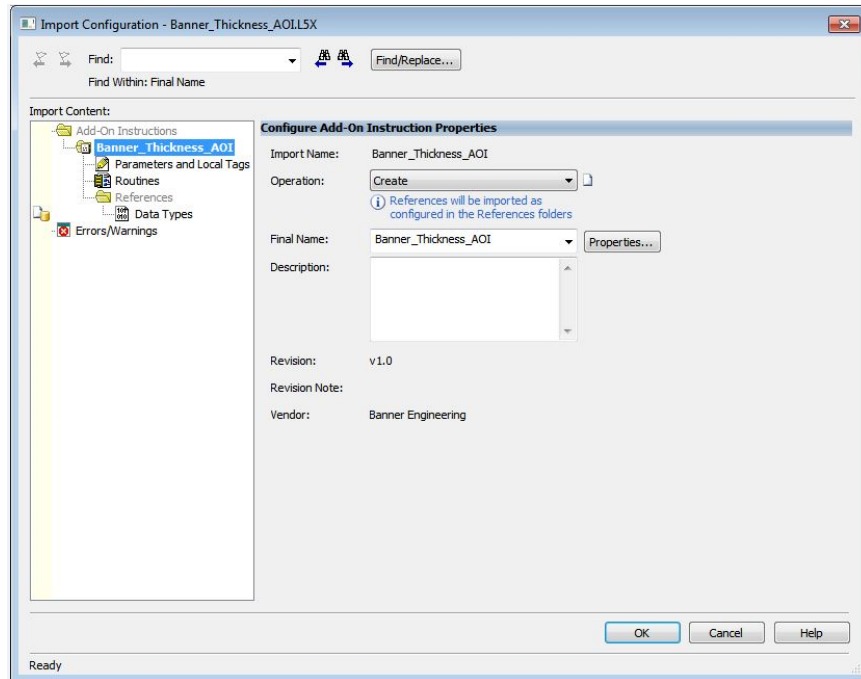This section describes how to install the AOI in Logix Designer software.

1. Open up a project.

2. In the Controller Organizer window, right-click on the Add-On Instruction folder. Select the Import Add-On Instruction option.
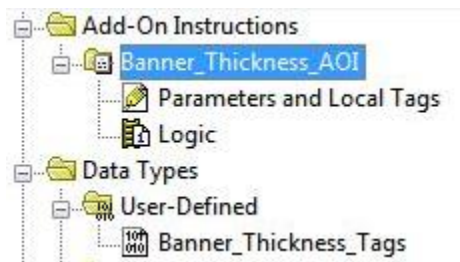

3. Navigate to the correct file location and select the AOI to be installed. In this example the "Banner_Thickness.L5X" file will be selected. Click the Open button.

4. The Import Configuration window will pop up. The default selection will create all of the necessary items for the AOI. Click the OK button to complete the import process.

5. The AOI is added to the Controller Organizer window and should look similar to the picture at left.

6. AOI installation into the Logix Designer software complete.

2.   Configuring the AOI

1. Add the "Banner_Thickness_AOI" to your ladder logic program. For each of the question marks shown in the instruction we need to create a new tag or link an existing tag. The AOI includes a new type of User Defined Tags (UDT): a custom array of tags meant specifically for this AOI.

2. In the AOI, right-click on the question mark on the line labeled "Banner_Thickness_AOI". Click New Tag. Name the new tag. This example uses the name "Thickness_1_Status". The example naming convention accounts for this being the first thickness measurement in the system. Click create.
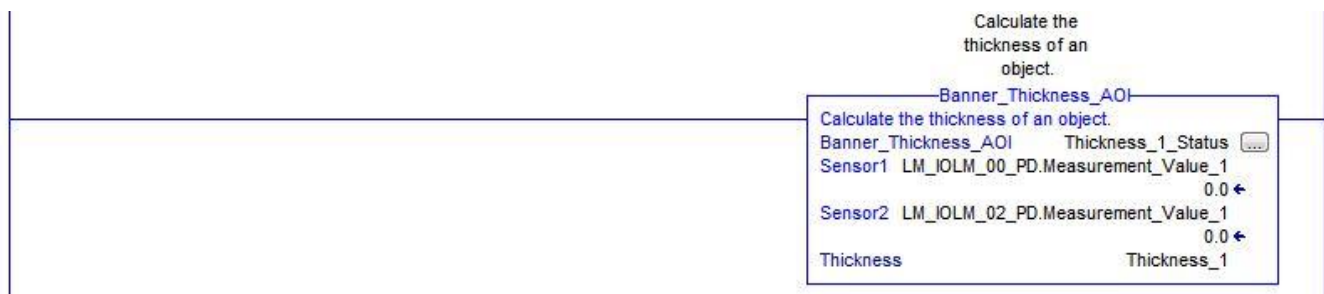
3. Sensor1 and Sensor2 are linked to either IO-Link Process Data In measurements or the analog values from analog measurement sensors. The example below uses two IO-Link sensors.

4. Now we will right-click on the question mark on the line labeled "Thickness" in the AOI. Click on "New Tag". Give the tag a name. This example uses the name "Thickness_1". Notice that the Data Type is "Banner_Thickness_Tags". Click Create.

   This array will handle the displaying of the calculated thickness measurement for two sensors.

   The "Banner_Thickness_AOI" is now ready for use.

3. Using the AOI

The "Banner_Thickness_AOI" Add-On Instruction has created a group of tags used to calculate the thickness of an object between two sensors.

Look in the Controller Tags to find the name you used above. This example used the name "Thickness_1". The tag array, seen below, has individual tags needed to calculate the thickness.

Thickness_1	{...}	{...}	
Thickness_1.CF1	0.0		Float
Thickness_1.CF2	0.0		Float
Thickness_1.Zero1	0.0		Float
Thickness_1.Zero2	0.0		Float
Thickness_1.Nominal_Value	0.0		Float
Thickness_1.Thickness_Value	0.0		Float
Thickness_1.Teach_Request	0		Decimal
Thickness_1.State	0		Decimal

1. Enter CF1 and CF2. CF stands for Conversion Factor. CF1 and CF2 are used, if necessary, to convert sensor readings into engineering units. Analog signals come to the PLC in unitless values (like counts) or in voltage (V) or current readings (mA). The CF1 and CF2 conversion factors are multipliers that convert these analog inputs into measurement readings of mm or inches. CF1 and CF2 are chosen based on the specific sensors used and have units of "mm/count" or "inches/Volt", for example. In the example below CF1 and CF2 are set to 1.0, as the IO-Link sensors in this example already export measurement values in mm.

2. Enter a Nominal_Value. This is the exact measurement of the test piece (in mm or inches) used to calibrate the AOI.

3. Now place the test piece between the sensors. Activate the AOIs Teach process by entering a 1 into the Teach Request register. After the AOI teach is complete Zero1 and Zero2 will have values in them. The State variable will change from 0 to 1 to indicate the teach process has completed.

4. Thickness_1 tag will look like the below example at this point.

Thickness_1	{...}	{...}	
Thickness_1.CF1	1.0		Float
Thickness_1.CF2	1.0		Float
Thickness_1.Zero1	62.938		Float
Thickness_1.Zero2	78.861		Float
Thickness_1.Nominal_Value	3.05		Float
Thickness_1.Thickness_Value	3.0490005		Float
Thickness_1.Teach_Request	0		Decimal
Thickness_1.State	1		Decimal

5. Thickness_Value now updates with the thickness of the part in either mm or inches.

Appendix A　　　　　Sensor Placement

The picture below shows the correct placement of the two sensors used in the Thickness setup. The edge of the test piece used for calibration is ideally placed at the midpoint of each sensor's measuring range.