

Stäubli/Bota How To

Setup a Bota Systems force torque sensor on a Stäubli robot arm and controller with the Stäubli Robotics Studio (SRS).

Introduction

The Bota Systems F/T sensor system measures (6) components of force and torque (F_x , F_y , F_z , M_x , M_y , M_z) and streams data to the robot systems from the manufacturer STÄUBLI. The sensor has two mounting sides. These sides are the connecting mechanical interfaces of the sensor. Refer to the Force/Torque sensor model drawings and specifications for more information. The sensor is IP67 rated. An IP67 rated connector is for the cable assembly provided with the sensor. The sensor is powered through this connector. For the electrical connector pin assignments, refer to 5.2. The Bota Systems sensors provide resolved force and torque data measured in N and Nm accordingly. Each F/T sensor model has its own reference frame which is shown in its specification sheet.

Intended Use

The presented software is intended to provide an example on how to establish communication between the sensor and the robot controller, and how the signals can be used in a custom application.

System Requirements

The connection and software has been tested for the following configurations:

- Bota Systems Force Torque Sensor LaxONE
- Robot controller: CS9 (s8.12.3)
- Robot: TX2-90
- Stäubli SRS 2019.10.1

Note that the installation is expected to work similarly on different robot arms and controllers.

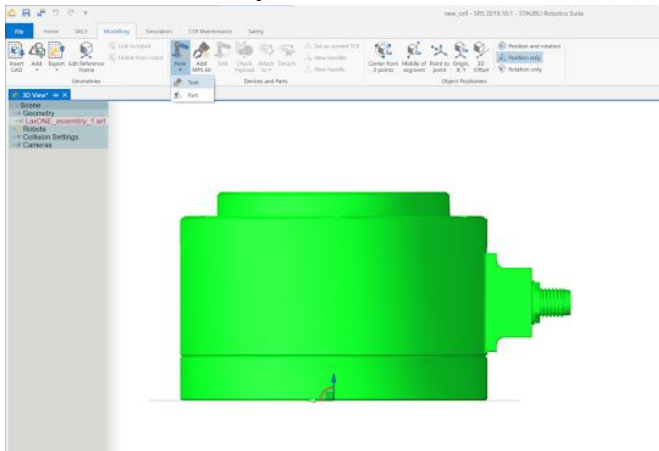
This Chapter gives an overview of how the (software) connection to the sensor on the robot controller can be achieved. Make sure that you are using the latest version of files that can be downloaded from (https://botasystemsag-my.sharepoint.com/:f/g/personal/mwermelinger_botasys_com/EnXSgHARuoFMqliQa89ZAAcB1RdzEvOVJwUi-LCUlgUmMA?e=duw1y7)

Open the Stäubli Robotics Suite (SRS)

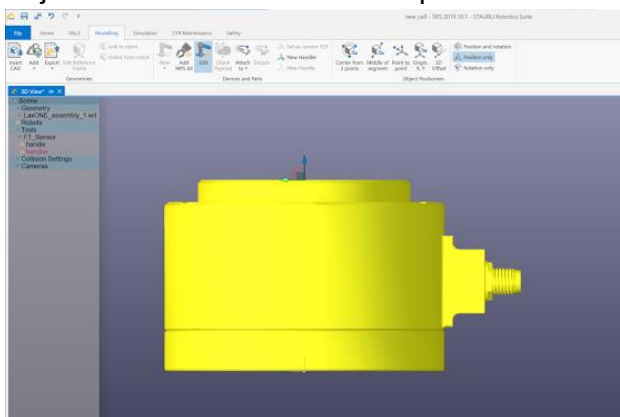
-
- The screenshot shows the SolidWorks software interface with the 'Insert CAD' dialog box open. The dialog box is titled 'Insert CAD' and has a close button (X) in the top right corner. The file path is 'C:\Users\Martin Wermelinger\Documents\Staubli\swl_setup\LasONE_assembly STEP --'. The 'Import precision' section has a slider set to 'Standard'. The 'Options' section has three radio buttons: 'Copy and insert the file', 'Insert as link', and 'Convert to WRL and insert file' (which is selected). Below these are two unchecked checkboxes: 'Import as assembly' and 'Import as optimised assembly'. The 'OK' and 'Cancel' buttons are at the bottom right.

-

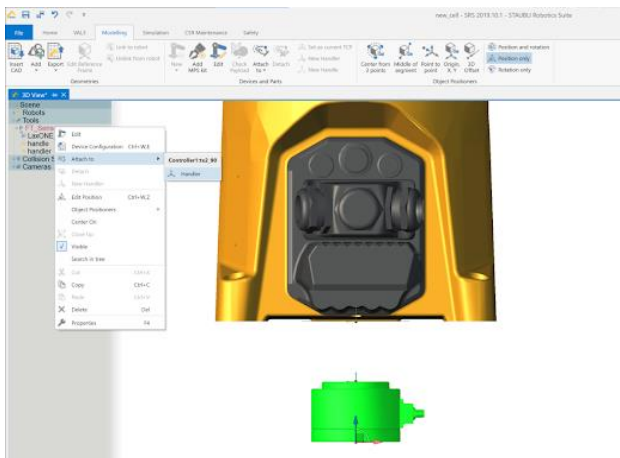
- Edit the tool and adjust the reference frame to correspond with the robot flange



- Adjust the tool handler to correspond to the sensor frame (see specification sheet)

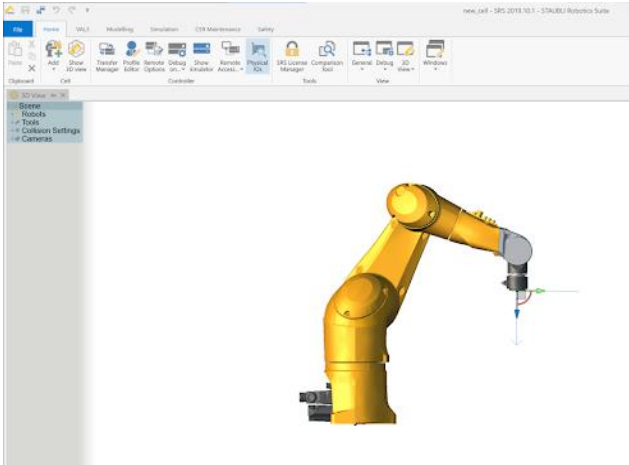


- Add tool to the robot handler

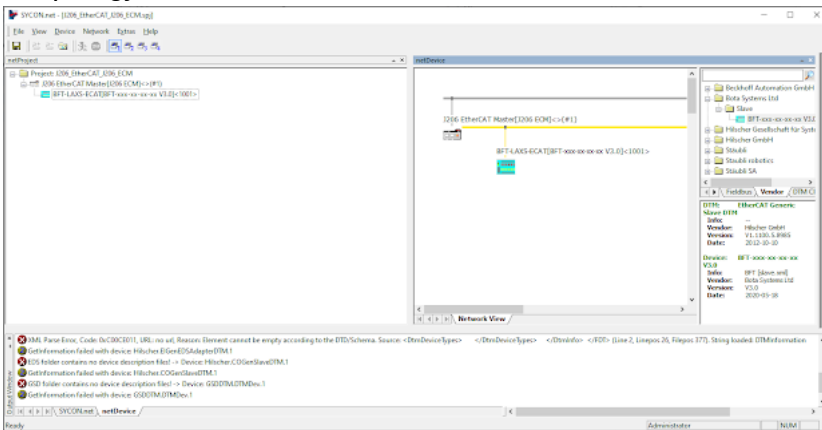


Create EtherCAT connection to the sensor

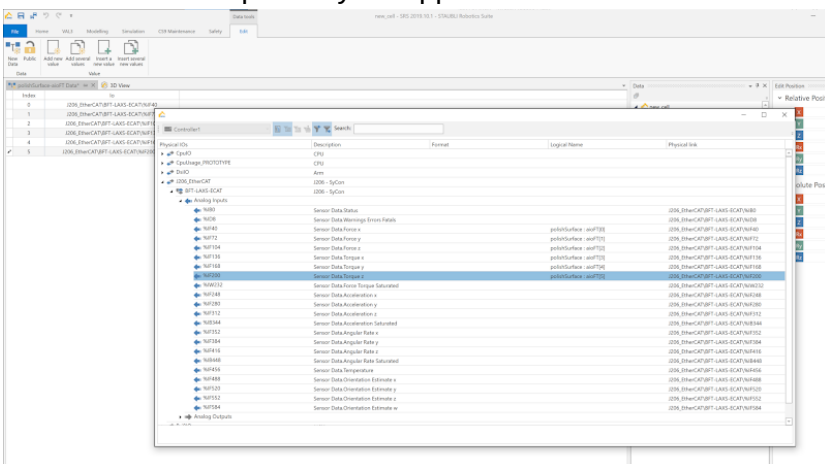
In the cell explorer select the controller and press the “Physical IOs” button. In the “Physical IOs” press the “Add IO boards” button. Follow the steps from the controller manual on how to import a new network device and add it to the bus.



Import the “bota_slave_esi.xml” network device description file and add the EtherCAT slave to your bus topology.



Finally, add the desired inputs to your application



Use the sensor in an application

Add the example applications into the SRS directory of the cell you are using: Staubli > SRS > CellName > ControllerName > usr > usrapp

The example application contain the following directories

- /types: Custom types and libraries used to define and transform forces and torques.
- /exampleApplication: An example to show how to read, offset, and filter the sensor in a separate thread.
- /polishSurface: An example that shows how the sensor is used to follow the contour of the surface.

Optional

- /gravityCompensation: Custom types and libraries used to estimate and compensate the inertial parameters of the tool
- /testGravityComp: run online estimation and compensation of inertial parameters of the attached tool (e.g. tool gravity compensation)