YASKAWA
PARTNER SUPPORT
Shared Integration Experience

This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

Configure EOAT CAD Models for MotoSize / Controller Tool Data

Introduction:

It is always important to have the correct mass data for your End of Arm Tool (EOAT) for sizing the correct robot model and using that tool data in the robot's controller.

Below are instructions to configure CAD data to display accurate mass properties in relation to the robot flange.

Check CAD model Integrity

In the CAD program verify the following:

1. All relevant models are solid bodies and not surface bodies (surfaces have no volume for mass to be calculated).
2. All manufactured models have the correct material applied (steel, aluminum, plastics, rubber, etc.).
3. All purchased components have either the correct material applied, or the mass is over-ridden with the reported mass provided by the manufacturer.
4. All relevant components are represented (anything that will generate enough mass) …this includes fasteners if there are many of them.
5. The mass of the part being picked needs to be represented since it can significantly impact the overall mass properties.

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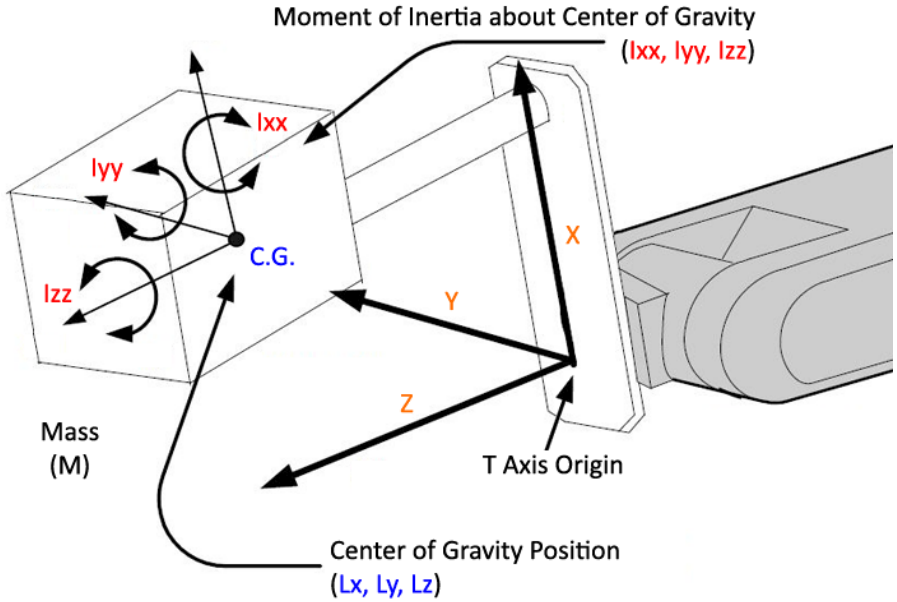
Configure the CAD Origin

It is critical that the origin is accurately located. It will affect the center of gravity and moments of inertia.

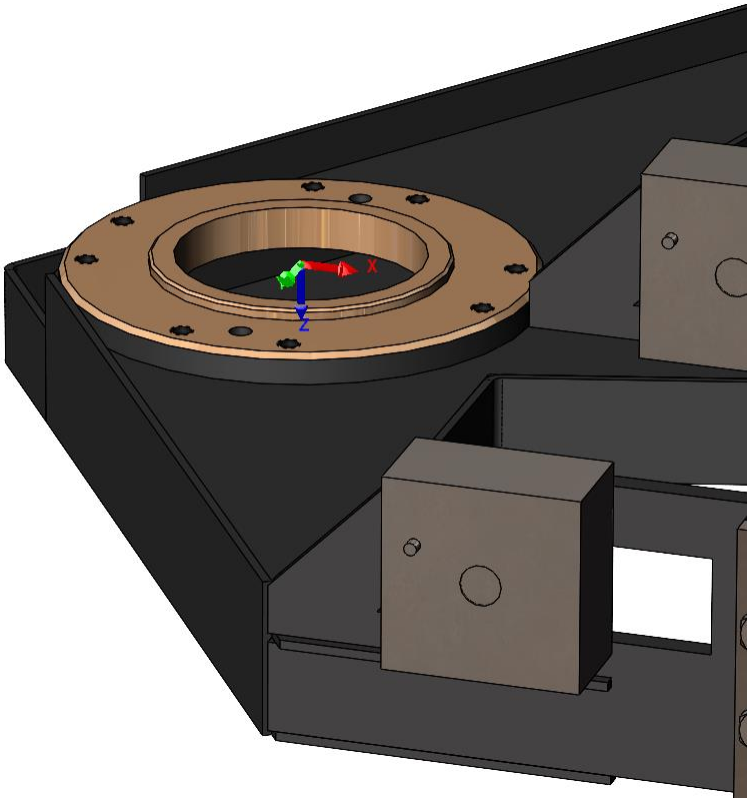
The origin needs to be located at the connection point of the robot flange and the tool.

It is also important how the origin is aligned with the robot flange…see the image below for details.



X: Direction that is directly above when the T axis is at 0 and the flange surface is turned to the front.
Y: Right-hand rule orthogonal cross product of Z X
Z: Perpendicular normal to the flange surface

Here is an example of proper alignment

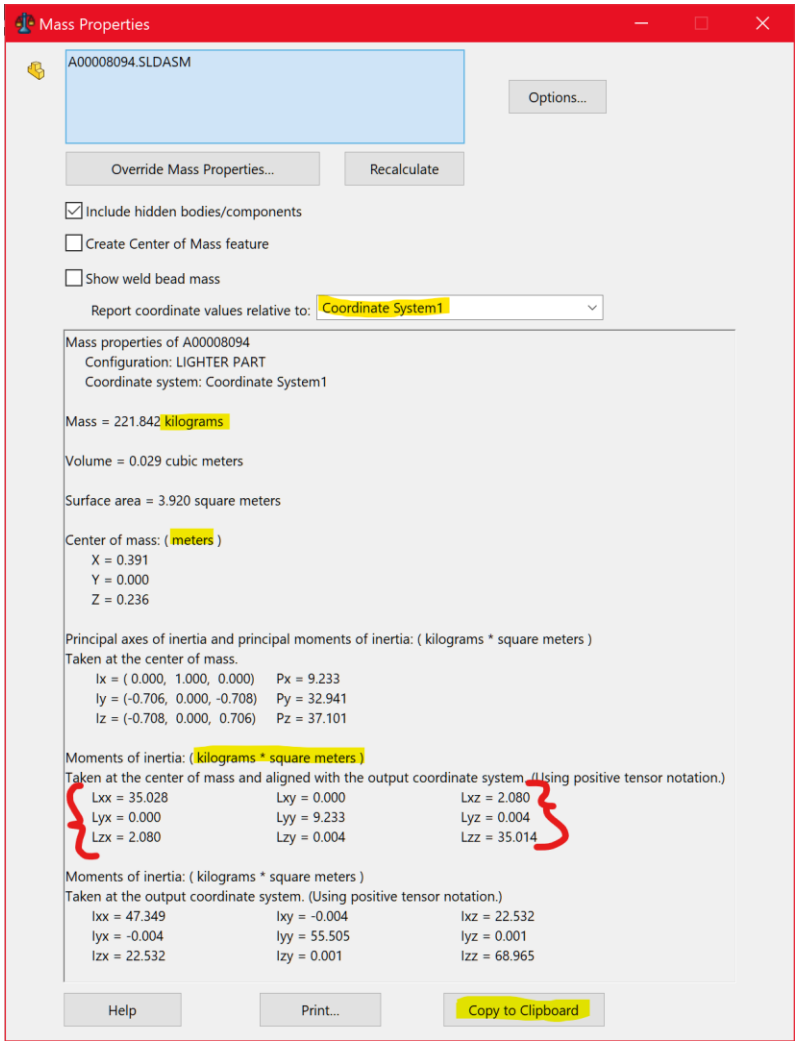


Z is normal (away) from the robot flange and X points away from the robot.

Note: Some applications like Solidworks allow additional coordinate systems to be created…making it easy to align the origin to the robot's flange. Just remember to select that coordinate system when exporting the mass properties.

Configure the Mass Data Output

After the models and origin have been configured, the last step is the mass properties.



The sample Mass Properties to the left displays how the results should look (note: this was taken from Solidworks; other CAD software will look different).

If entering data for MotoSize calculations:

1. Select the correct coordinate system
2. Verify that the units are set to Kilogram & meters
3. Copy the data to the clipboard and paste them into notepad…this can be used to directly import the data if the source CAD application is Solidworks, Solid Edge, Creo, or Inventor.

   If manually entering the data select Mass, Center of Mass, and Moments of Inertia.

   Note: some CAD applications report multiple types of Moments of Inertia; like Solidworks. If so, then use the one taken at the center of mass and aligned with the output coordinate system.

If entering data in the robot controller:

1. Select the correct coordinate system
2. Verify that the units are Kilograms and meters
3. Enter the Mass (kg), Center of Mass (mm), and Moments of Inertia (kg*m^2)

Solidworks		
Lxx	→	Ix
Lyy	→	Iy
Lzz	→	Iz