

How to export a URDF file from SolidWorks and import it as a rigidbodytree in MATLAB

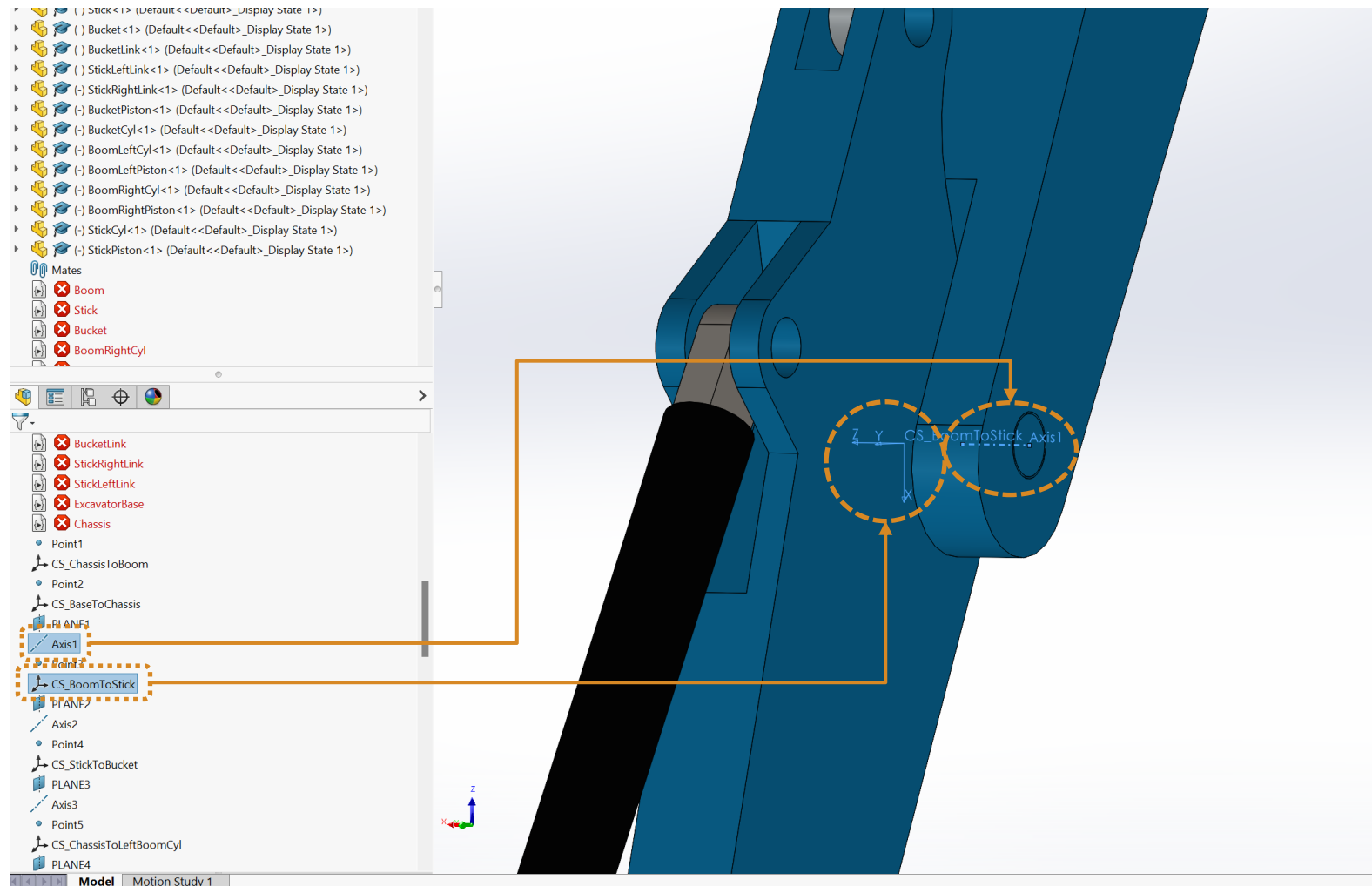
Max Busch

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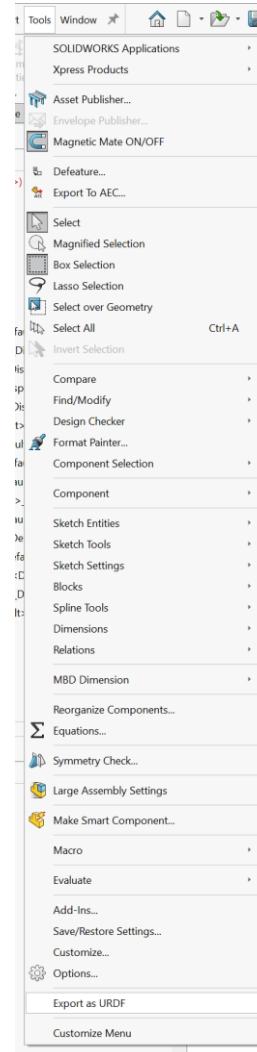
Prerequisites

- You must have a fully defined CAD model for your kinematic chain(s).
- Closed kinematic chains are not supported by URDF.
- The idea is to create a kinematic chain of rigid bodies which are connected by joints.
- There should be defined coordinate systems at the joint locations between the bodies.
- There should be defined axes for movement and rotation axes.
- The SolidWorks URDF exporter must be installed ([sw_urdf_exporter - ROS Wiki](#)).

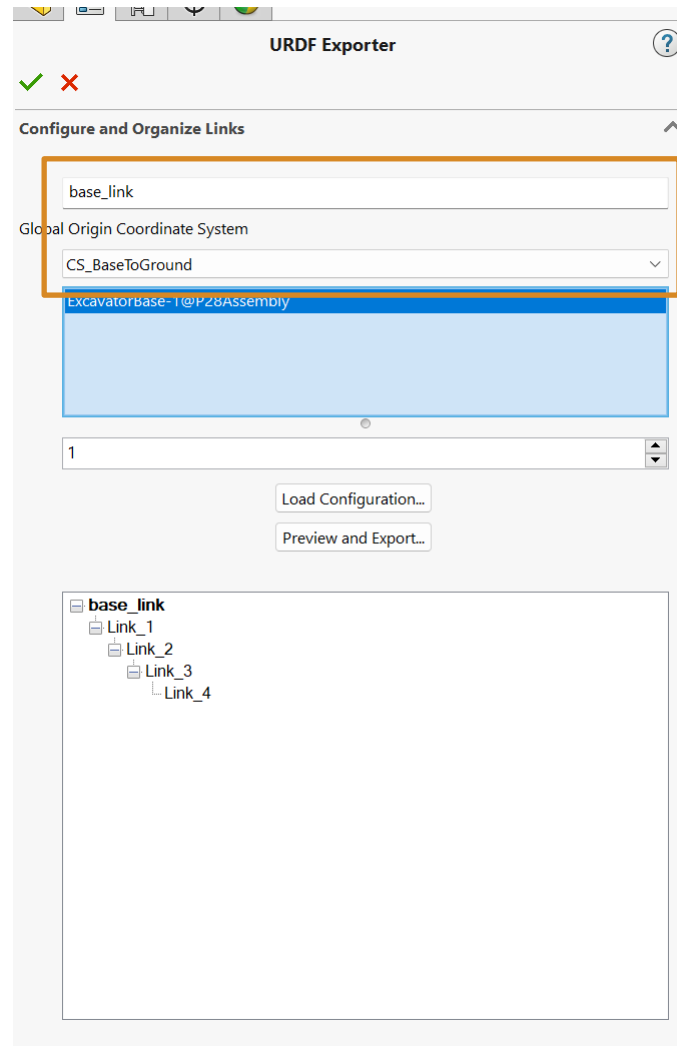
Example



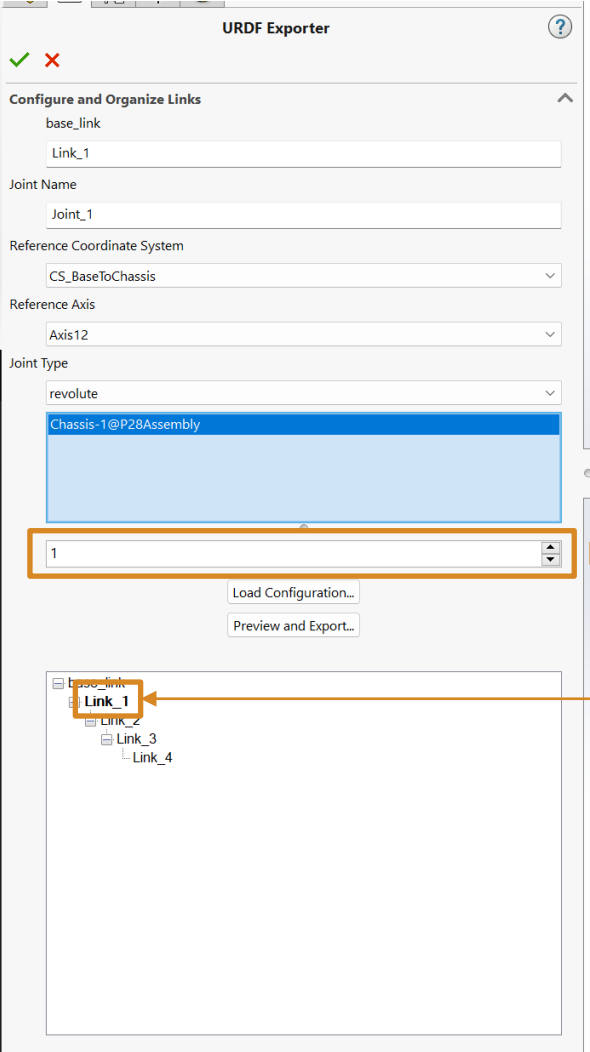
Start the URDF exporter



1: Start with base_link and define the global (base) coordinate system



2: Define number of child bodies and select those



The screenshot shows the **URDF Exporter** dialog box. The **Configure and Organize Links** section is expanded, showing fields for **base_link** (set to `Link_1`), **Joint Name** (set to `Joint_1`), **Reference Coordinate System** (set to `CS_BaseToChassis`), **Reference Axis** (set to `Axis12`), and **Joint Type** (set to `revolute`). A list of child links is shown below, with `Chassis-1@P28Assembly` selected. An orange box highlights the `1` in the **Number of child bodies** field. An orange arrow points from this box to a text box that says **Select body in CAD**. Another orange arrow points from the text box to the `Link_1` entry in the child links list, which is also highlighted with an orange box.

URDF Exporter

✓ ✕

Configure and Organize Links

base_link
Link_1

Joint Name
Joint_1

Reference Coordinate System
CS_BaseToChassis

Reference Axis
Axis12

Joint Type
revolute

Chassis-1@P28Assembly

1

Load Configuration...

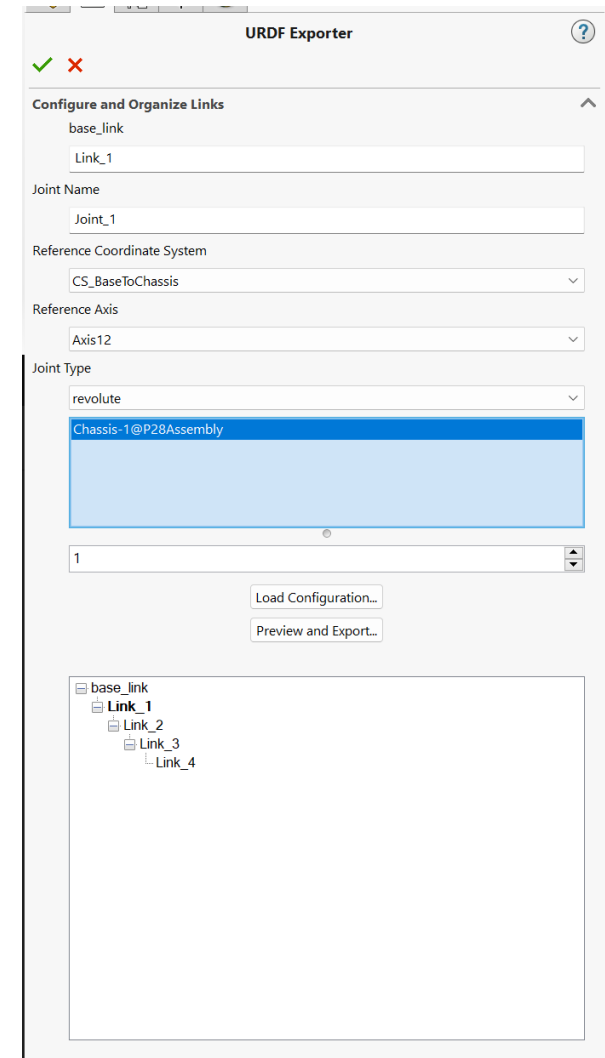
Preview and Export...

base_link
Link_1
Link_2
Link_3
Link_4

Select body in CAD

3: Define properties

- Define name of joint
 - Define Reference Coordinate System
 - Define Reference Axis (e.g., rotational axis)
 - Define movement type (e.g., rotation)
-
- Then, start over with step (2) until the last body (which has 0 childs)



Click „Preview and Export „and set additional properties

- Origins, inertia tensors, etc. are calculated automatically from CAD and material properties.
- You must specify the joint limits for later use in MATLAB
- Click „Next“

SolidWorks Assembly to URDF Exporter

Configure Joint Properties

Customize the joint properties. If you want to adjust the coordinate systems and axes in the model, click cancel and restart the export. The tool will recognize your changes on the next run.

Joint_1

Parent Link: base_link

Child Link: Link_1

Joint Name: Joint_1

Joint Type: revolute

Coordinates: CS_BaseToChassis

Axis: Axis12

Origin *

Position (m)

x 0

y 0

z 1.295

Orientation (rad)

Roll 0

Pitch 0

Yaw 0

Axis *

x 0

y 0

z 1

Limit *

lower (rad) -6.2832

upper (rad) 6.2832

effort (N-m) 0

velocity (rad/s) 0

Calibration

rising

falling

Dynamics

friction (N-m)

damping (N-m-s/rad)

Safety Controller

soft lower limit (rad)

soft upper limit (rad)

k position

k velocity

☐ Mimic Other Joint

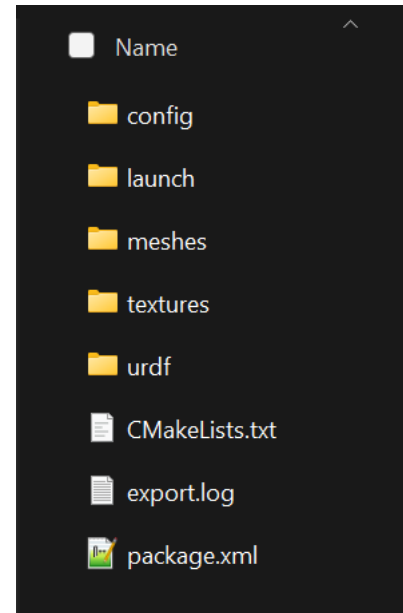
Cancel

Next

Entries that are blank will not be written to URDF.
* Field group is required

Click „Export URDF and Meshes“

- Move urdf file from „urdf“ to „meshes“



Import in MATLAB

```
Current Folder
Name ^
Date Modified
base_link.STL 04.09.2023 09:21
Link_1.STL 04.09.2023 09:21
Link_2.STL 04.09.2023 09:21
Link_3.STL 04.09.2023 09:21
Link_4.STL 04.09.2023 09:21
P28Assembly.SLDASM.urdf 04.09.2023 09:21

Command Window

>> rbtree = importrobot("P28Assembly.SLDASM.urdf")

rbtree =

rigidBodyTree with properties:

    NumBodies: 4
    Bodies: {[1x1 rigidBody] [1x1 rigidBody] [1x1 rigidBody] [1x1 rigidBody]}
    Base: [1x1 rigidBody]
    BodyNames: {'Link_1' 'Link_2' 'Link_3' 'Link_4'}
    BaseName: 'base_link'
    Gravity: [0 0 0]
    DataFormat: 'struct'

>> show(rbtree)

ans =

Axes (Primary) with properties:

    XLim: [-11.5000 11.5000]
    YLim: [-11.5000 11.5000]
    XScale: 'linear'
    YScale: 'linear'
    GridLineStyle: '-'
    Position: [0.1300 0.1100 0.7750 0.8150]
    Units: 'normalized'

Show all properties

fx >>
```

