Exercise 21: Programmatically Convert Joints into Drives (SimMechanics)

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1. Summary of the already explained aspects of the VLFL-Toolbox

The previous examples of this series covered the following topics:

- Example 01: First Steps Using the VLFL-Toolbox for Solid Object Design
- Example 02: Using the VLFL-Toolbox for STL-File Export and Import
- Example 03: Closed 2D Contours and Boolean Operations in 2D
- Example 04: 2.5D Design Using Boolean Operators on Closed Polygon Lists (CPL)
- Example 05: Creation, Relative Positioning and Merging of Solid Geometries (SG)
- Example 06: Relative Positioning and Alignment of Solid Geometries (SG)
- Example 07: Rotation of Closed Polygon Lists for Solid Geometry Design
- Example 08: Slicing, Closing, Cutting and Separation of Solid Geometries
- Example 09: Boolean Operations with Solid Geometries
- Example 10: Packaging of Sets of Solid Geometries (SG)
- Example 11: Attaching Coordinates Frames to Create Kinematik Models
- Example 12: Define Robot Kinematics and Detect Collisions
- Example 13: Mounting Faces and Conversion of Blocks into Leightweight-structures
- Example 14: Manipulation Functions for Closed Polygons and Laser Cutting (SVG)
- Example 15: Create a Solid by 2 Closed Polygons
- Example 16: Create a Solid along a contour
- Example 20: Programmatically Interface to SimMechanics Multi-Body Toolbox
- Example 21: Programmatically Convert Joints into Drives (SimMechanics)

2. Creating a new SimMechanics System

```
smbNewSystem ('SG_LIB_EXP_21');           % Creates the mechansim diagramm
```

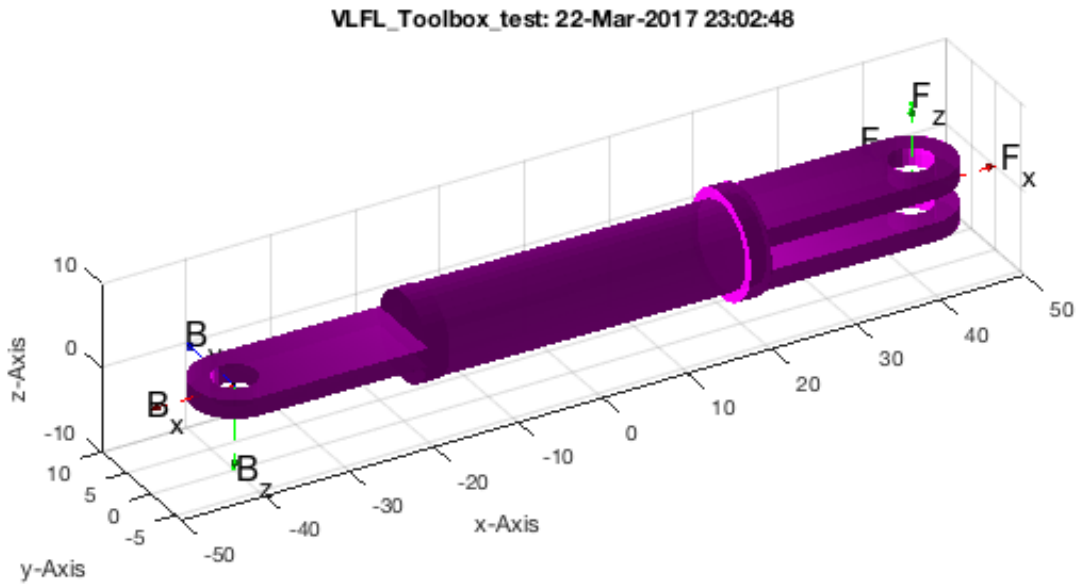
```
Creating temporary directory '/Users/lueth/Desktop/tmp_SG_LIB_EXP_21/'
```



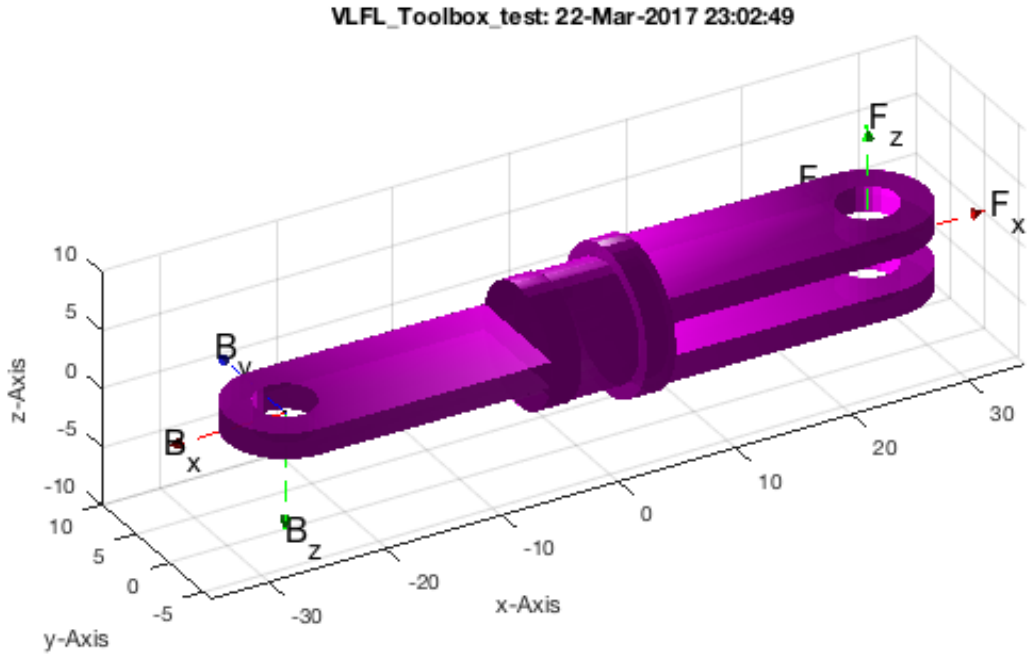
3. Create two links with length 50 and 80 and one or two mounting holes

```
SG1=SGmodelLink(80,'',1,2);              % Creates a long rod with flange
SG2=SGmodelLink(50,'',1,2);              % Creates a short rod with flange
```

```
SGfigure; view(-30,30); axis on;
SGT(SG1);
```

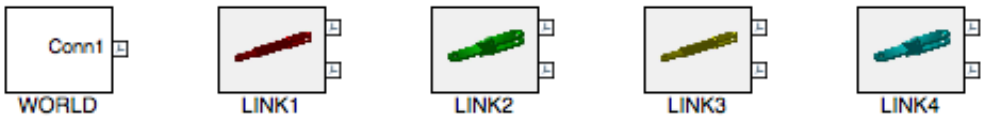



```
SGfigure; view(-30,30); axis on;
SGT (SG2);
```



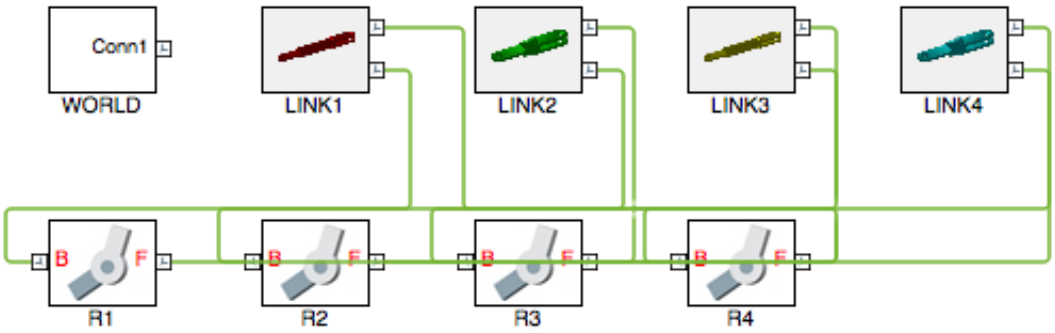
4. Create SimMechanics models for the four links in different colors

```
smbCreateSG (SG1,'LINK1','r');              % Add long rod as LINK1
smbCreateSG (SG2,'LINK2','g');              % Add short rod as LINK2
smbCreateSG (SG1,'LINK3','y');              % Add long rod as LINK3
smbCreateSG (SG2,'LINK4','c');              % Add short rod as LINK4
smbDrawNow;
```



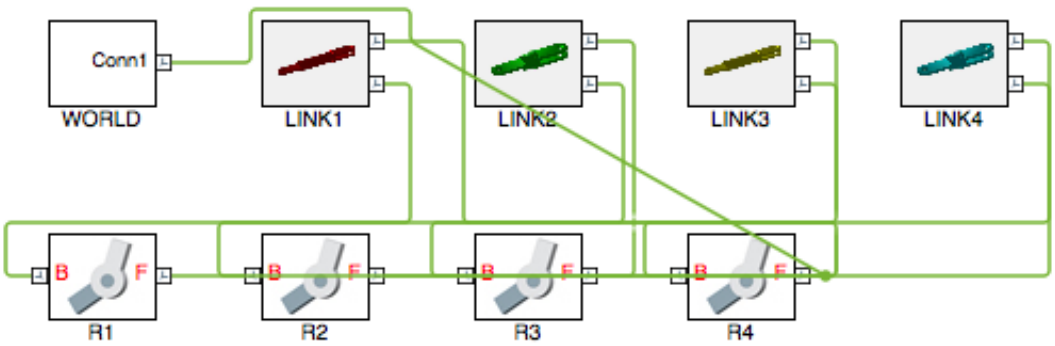
5. Create SimMechanics models for the four joint and connect them with the links

```
smbCreateJoint ('R','R1','LINK1.F','LINK2.B'); % Add a RR Joint
smbCreateJoint ('R','R2','LINK2.F','LINK3.B'); % Add a RR Joint
smbCreateJoint ('R','R3','LINK3.F','LINK4.B'); % Add a RR Joint
smbCreateJoint ('R','R4','LINK4.F','LINK1.B'); % Add a RR Joint
smbDrawNow;
```



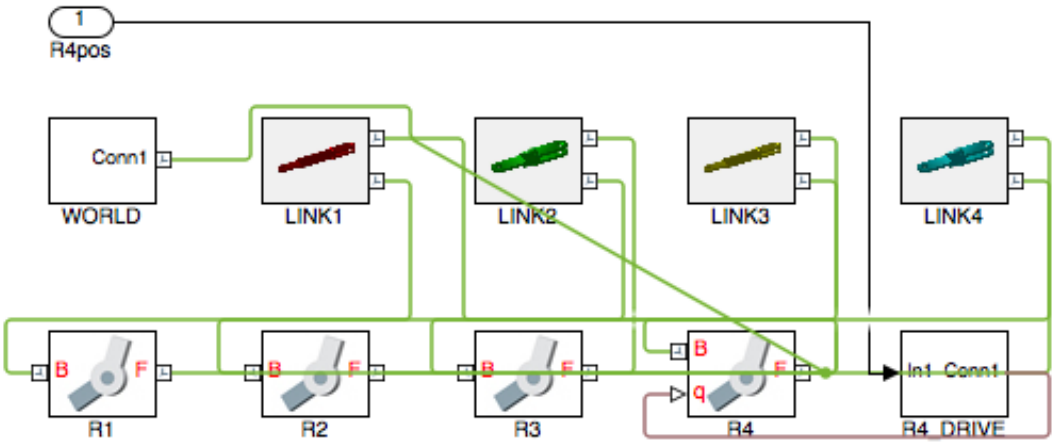
6. Connect the base frame of link1 to the world coordinate system

```
smbCreateConnection('WORLD.ORIGIN','LINK1.B'); % Connect Linkage to World Frame
smbDrawNow;
```



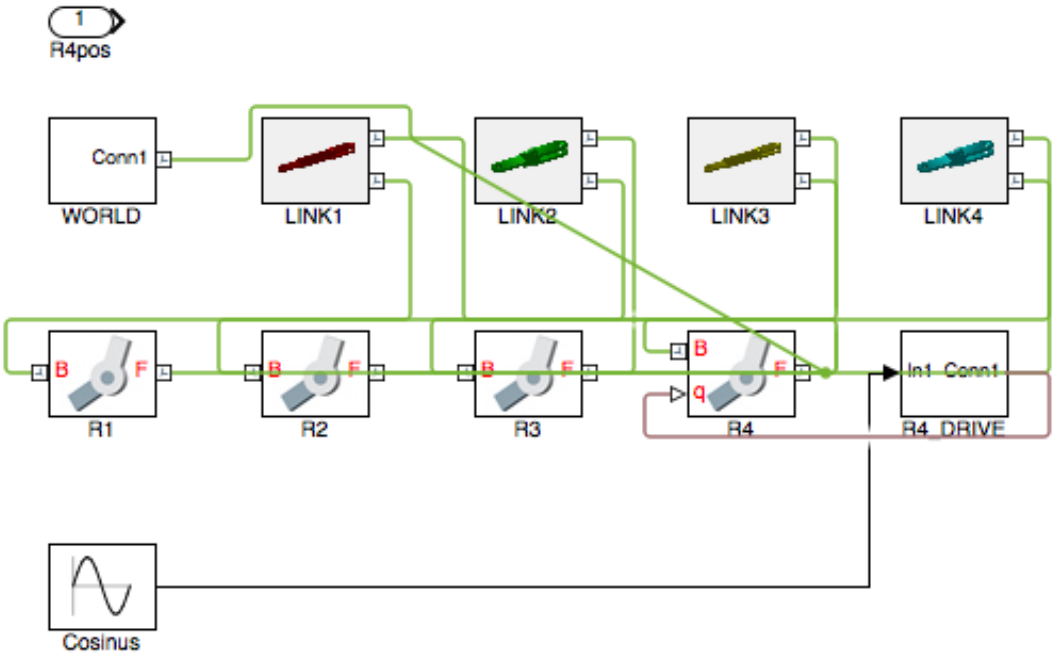
7. Create a SimMechanics model for a motor/drive and use a Cosinus Rotation

```
smbCreateDrive ('R4');                          % Convert Joint R4 into a Drive
smbDrawNow;
```



8. Create a Simulink models for a cosinus signal

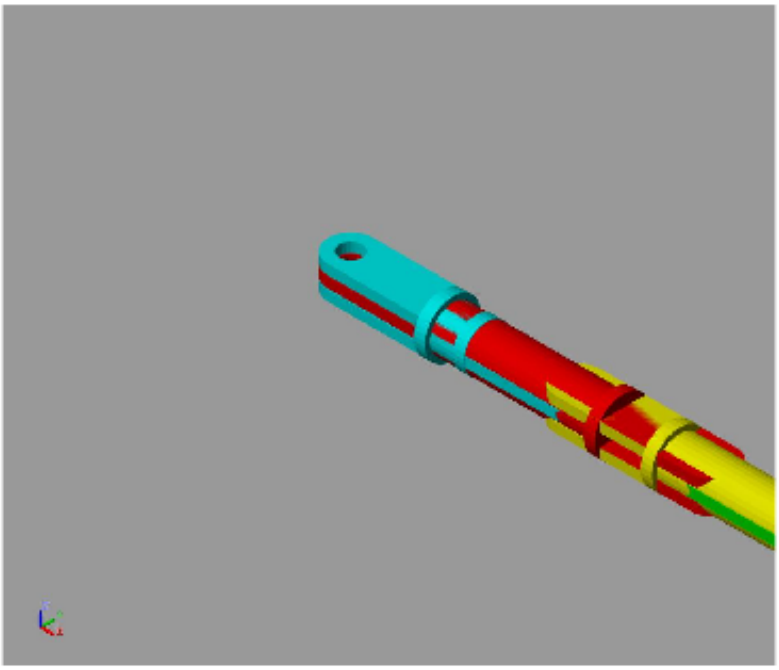
```
smbCreateSineWave ('Cosinus','R4_DRIVE/1');     % Connect a Sinus Generator to Drive
smbDrawNow;
```



9. Create a Video of the Simualati0n for 10 seconds

```
smbVideoSimulation;  % Show a 5 seconds video
```

.....



Final remarks on toolbox version and execution date

```
VLFLlicense
```

```
This VLFL-Lib, Rel. 3.6 (2017-Mar-23), is for limited non commercial educational use only!
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Please contact Tim Lueth, Professor at TU Munich, Germany!
WARNING: This VLFL-Lib (Rel. 3.6) license will exceed at 18-Mar-2018!
Executed 22-Mar-2017 23:03:20 by 'lueth' using Matlab 9.1.0.441655 (R2016b) on a MACI64
======================================== Used Matlab products: ============================
==========
map_toolbox
matlab
robotics_system_toolbox
simmechanics
simscape
simulink
================================================================================================
==========
```

- *Tim Lueth, tested and compiled on OSX 10.11.6 with Matlab 2016 on 2016-12-09*
- _____, executed and published on 64 Bit PC using Windows with Matlab 2015a on 2015-xx-xx_

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