Exercise 24: Automatic Creation of a Joint Limitations

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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: Programmaticaly Interface to SimMechanics Multi-Body Toolbox
- Example 21: Programmaticaly Design of SimMechanisms Mechanisms and Simulink Signals
- Example 22: Creation of fixed nodes for the assembly of joints
- Example 23: Automatic Creation of a Missing Link and 3D Print of a Complete Model
- Example 24: Automatic Creation of a Joint Limitations

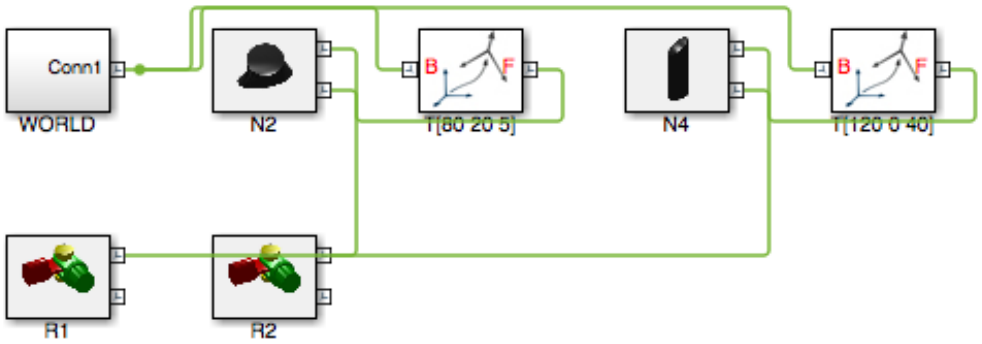
2. Open a system and create several fixed nodes and attach revolute joints

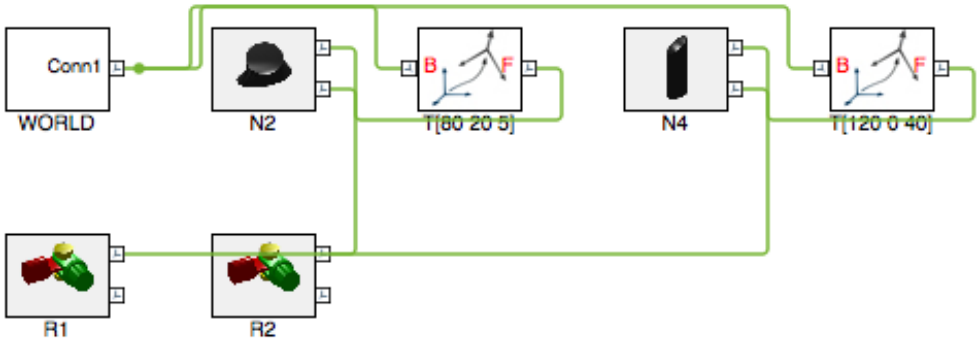
function VLFL_EXP23

```
smbsys='SG_LIB_EXP_24';
smbNewSystem (smbsys);

smbCreateSGNode ([80  20  5],'N2','',rot(0,0,pi/3));
smbCreateSGNode ([120 0 40],'N4','',rot(0,-pi/8,0));
A=SGmodelJoint('R',pi/2);
smbCreateSGJoint('R','R1', A,'N4.F');
smbCreateSGJoint('R','R2',A,'N2.F');
smbDrawNow;
```

```
Creating temporary directory '/Users/lueth/Desktop/tmp_SG_LIB_EXP_24/'
```





3. Create a cylindric joint from two solids an attach it to revolute joint

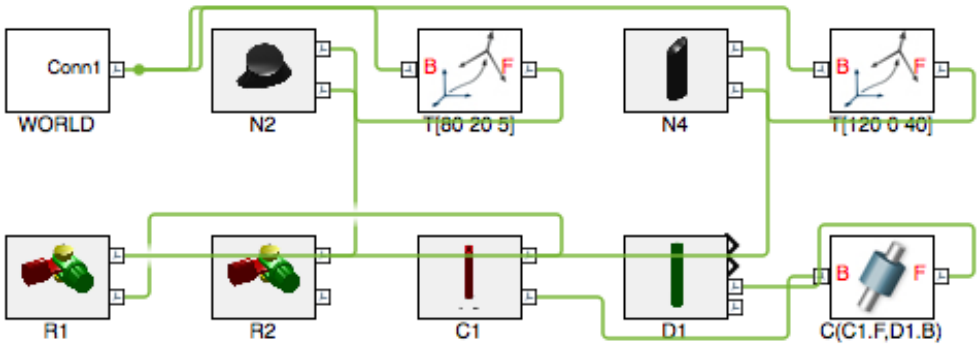
```
Ro=5;
Ri=3;
slot=0.3;

C1=SGofCPLz([PLcircle(Ro);NaN NaN;PLcircle(Ri+slot)],30);
% C1=SGTset(C1,'B',TofSG(C1,'bottom','roty',pi));
C1=SGTset(C1,'B',TofSG(C1,'incenter','right',-1,'roty',pi/2));
C1=SGTset(C1,'F',TofSG(C1,'bottom'));
smbCreateSG(C1,'C1','r','R1_M');
D1=SGofCPLz(PLcircle(3),30);
```

```
D1=SGTset(D1,'B',TofSG(D1,'incenter'));
D1=SGTset(D1,'F',TofSG(D1,'top'));
```

4. Attach two frame sensor to record the movement of the falling cylinder

```
smbCreateSG(D1,'D1','g');
smbCreateConnection('C1.F','D1.B','C');
smbAddFrameSensor('R2_M.F');
smbAddFrameSensor('D1.F');
smbDrawNow;
```



5. Show the Simulation

```
simOut=smbSimulate(0.1);
smbVideoSimulation(4);
```

....

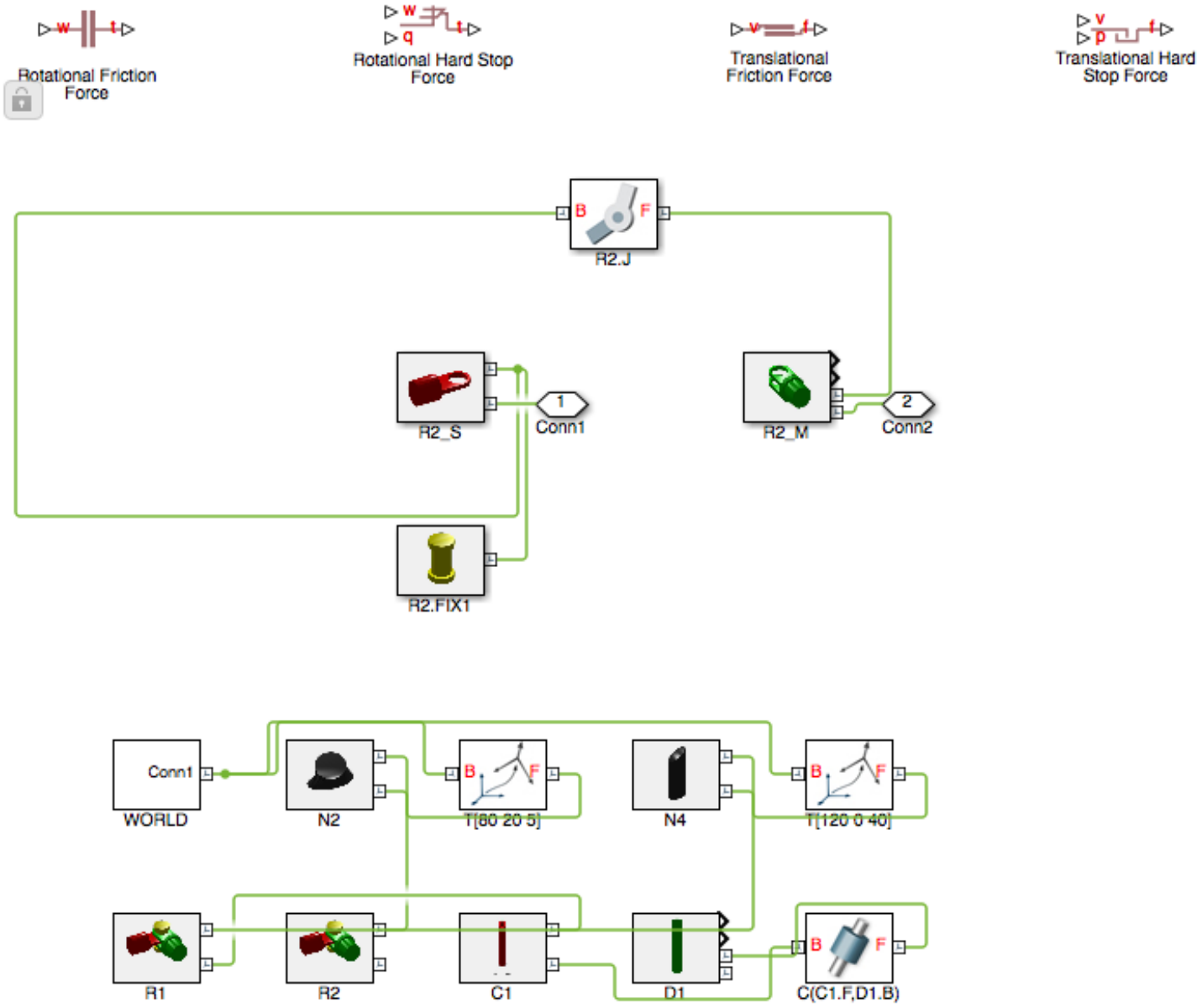


6. Install additional block funktion for joint restrictions

```
smbPSLibInstall
```

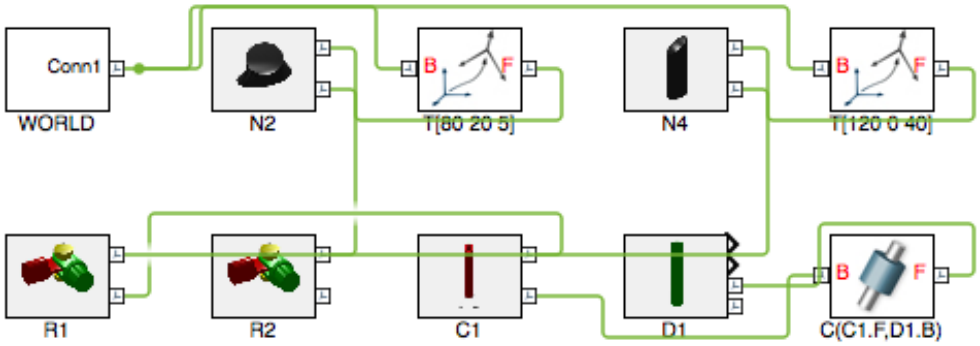
```
open_system(smbPSBlockname);
open_system(smbsys,'tab');
open_system(smbWhich('R2'),'tab');smbDrawNow;
```

```
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_friction_rot.ssc
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_friction_rot.svg
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_hardstop_rot.ssc
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_hardstop_rot.svg
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_friction_trans.ssc
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_friction_trans.svg
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_hardstop_trans.ssc
Create /Users/lueth/Desktop/tmp_SG_LIB_EXP_24/+mechPS_Tim_Lueth/PS_force_hardstop_trans.svg
Generating Simulink library 'mechPS_Tim_Lueth_lib' in the current directory '/Users/lueth/Desk
top/tmp_SG_LIB_EXP_24' ...
```



7. Create a stopp joint and copy all connections of an existing joint

```
smbCreateStopJointR ('R2stop.J',[-pi/2 +pi/2]);
smbCopyConnections  ('R2.J','R2stop.J');
smbDrawNow;
```



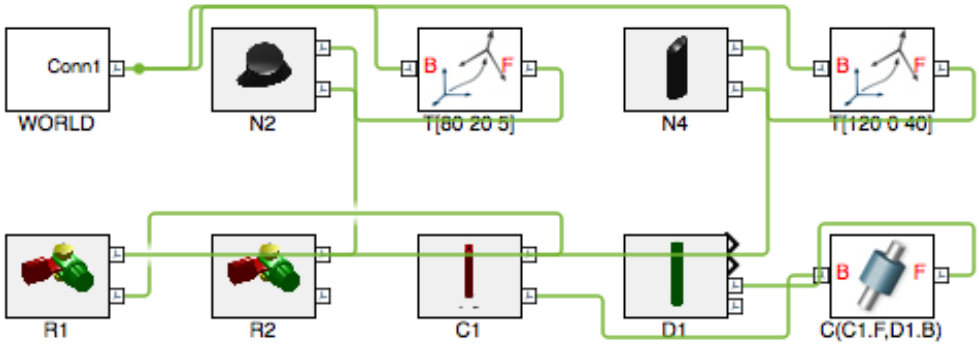

```
smbVideoSimulation(4);
```

.....

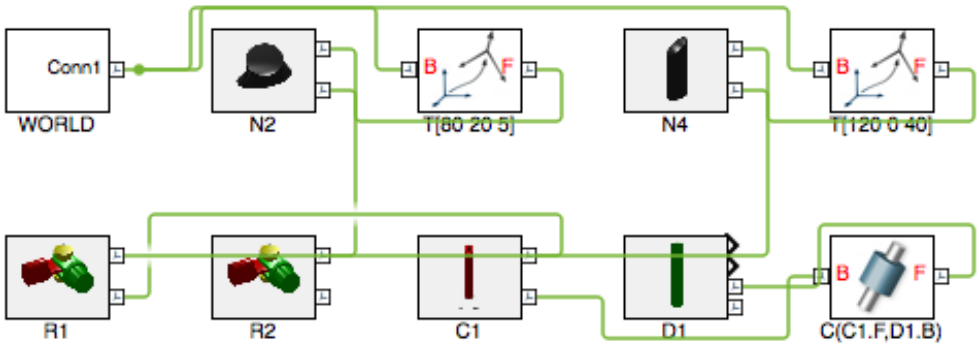


8. Create a stopp joint and replace an existing joint

```
delete_block(smbWhich('R2stop.J'));
smbDeleteUnconnectedLines;
smbDrawNow;
```




```
smbCreateStopJointR ('R2new.J',[-pi/2 +pi/2]);
smbCopyConnections  ('R2.J','R2new.J','replace');
smbDrawNow;
```



9. Final Remarks

```
VLFLlicense
```

```
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