

Tutorial 46: Creating Fischertechnik comptabile Gears using SGofCPLCommand

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Complete List of all Tutorials with Publishable MATLAB Files of this Solid-Geoemtries Toolbox

The following topics are covered an explained in the specific tutorials:

- Tutorial 01: First Steps Using the VLFL-Toolbox for Solid Object Design
- Tutorial 02: Using the VLFL-Toolbox for STL-File Export and Import
- Tutorial 03: Closed 2D Contours and Boolean Operations in 2D
- Tutorial 04: 2½D Design Using Boolean Operators on Closed Polygon Lists (CPL)
- Tutorial 05: Creation, Relative Positioning and Merging of Solid Geometries (SG)
- Tutorial 06: Relative Positioning and Alignment of Solid Geometries (SG)
- Tutorial 07: Rotation of Closed Polygon Lists for Solid Geometry Design
- Tutorial 08: Slicing, Closing, Cutting and Separation of Solid Geometries
- Tutorial 09: Boolean Operations with Solid Geometries
- Tutorial 10: Packaging of Sets of Solid Geometries (SG)
- Tutorial 11: Attaching Coordinates Frames to Create Kinematik Models
- Tutorial 12: Define Robot Kinematics and Detect Collisions
- Tutorial 13: Mounting Faces and Conversion of Blocks into Leightweight-structures
- Tutorial 14: Manipulation Functions for Closed Polygons and Laser Cutting (SVG)
- Tutorial 15: Create a Solid by 2 Closed Polygons
- Tutorial 16: Create Tube-Style Solids by Succeeding Polygons
- Tutorial 17: Filling and Bending of Polygons and Solids
- Tutorial 18: Analyzing and modifying STL files from CSG modeler (Catia)
- Tutorial 19: Creating drawing templates and dimensioning from polygon lines
- Tutorial 20: Programmatically Interface to SimMechanics Multi-Body Toolbox
- Tutorial 21: Programmatically Convert Joints into Drives (SimMechanics)
- Tutorial 22: Adding Simulink Signals to Record Frame Movements
- Tutorial 23: Automatic Creation of a Missing Link and 3D Print of a Complete Model
- Tutorial 24: Automatic Creation of a Joint Limitations
- Tutorial 25: Automatic Creation of Video Titels, Endtitels and Textpages
- Tutorial 26: Create Mechanisms using Universal Planar Links
- Tutorial 27: Fourbar-Linkage: 2 Pose Syntheses and Linkage Export for 3D Printing
- Tutorial 28: Fourbar-Linkage: 3 Pose Syntheses and Linkage Export for 3D Printing
- Tutorial 29: Create a multi body simulation using several mass points
- Tutorial 30: Creating graphical drawings using point, lines, surfaces, frames etc.
- Tutorial 31: Importing 3D Medical DICOM Image Data and converting into 3D Solids
- Tutorial 32: Exchanging Data with a FileMaker Database
- Tutorial 33: Using a Round-Robin realtime multi-tasking system
- Tutorial 34: 2D Projection Images and Camera Coordinate System Reconstruction
- Tutorial 35: Creation of Kinematic Chains and Robot Structures
- Tutorial 36: Creating a Patient-Individual Arm-Skin Protector-Shell
- Tutorial 37: Dimensioning of STL Files and Surface Data
- Tutorial 38: Some more solid geometry modelling function
- Tutorial 39: HEBO Modules robot design
- Tutorial 40: JACO Robot Simulation and Control
- Tutorial 41: Inserting Blades, Cuts and Joints into Solid Geometries
- Tutorial 42: Performing FEM Stress and Displacement Analysis and Structural Optimization of Solids
- Tutorial 43: Performing FEM Structural Optimization (CAO) and Topological Optimization (SKO) of Solids
- Tutorial 44: Creation of solids and kinematics from 3D curves and transformation matrices

- Tutorial 45: Creation of Solids using the SG-Coder - SGofCPLcommand
- Tutorial 46: Creating Fischertechnik comptabile Gears using SGofCPLcommand

Motivation for this tutorial: (Originally SolidGeometry 4.4 required)

As part of his doctoral thesis, Yilun Sun tested the functions of the SG library and made proposals for its implementation. In this tutorial he shows how to work with the SG-Language from SGofCPLcommand.

List of function introduced in this tutorial

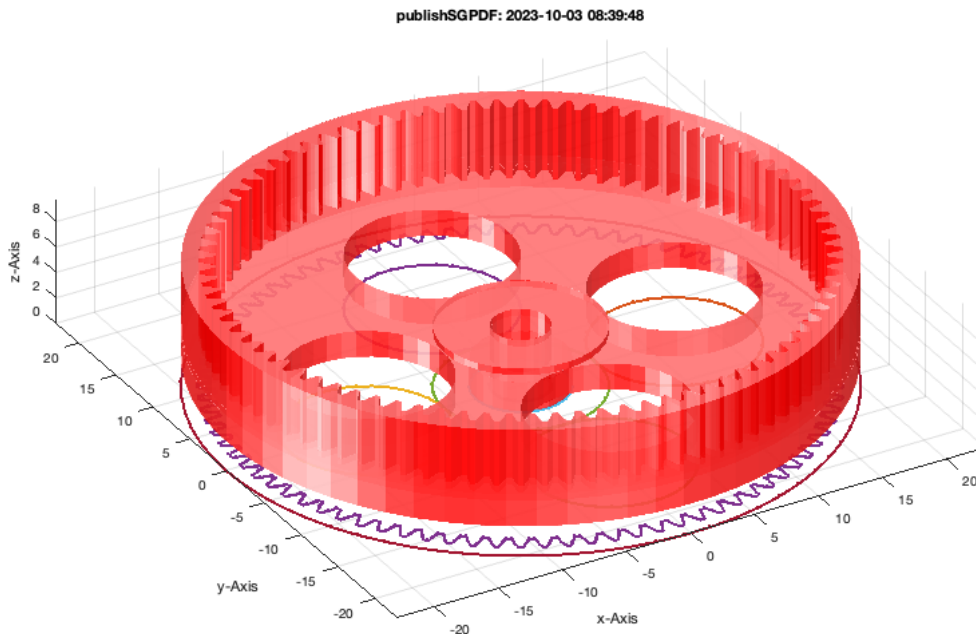
- SGofCPLcommand - Formal language (RPN/Forth) to create solid volumes *

1. Hohlrad

```
SGofCPLcommand('g -42.3 84,c 46,h 5,g -42.3 84,c 46,c 12,c 4.2,h 0.5,c 46,c 4.2,cp 12 0,c 12,cp -12 0,c 12,cp 0 12,c 12,cp 0 -12,c 12,h 2,cp 0 0,c 7,c
```

```
SGofCPLcommand: SGofCPLcommand("g -42.3 84,c 46,h 5,g -42.3 84,c 46,c 12,c 4.2,h 0.5,c 46,c 4.2,cp 12 0,c 12,cp -12 0,c 12,cp 0 12,c 12,cp 0 -12,c 12,h
SGofCPLcommand: SGfigureeval('SGofCPLcommand("g -42.3 84,c 46,h 5,g -42.3 84,c 46,c 12,c 4.2,h 0.5,c 46,c 4.2,cp 12 0,c 12,cp -12 0,c 12,cp 0 12,c 12,c
ans =
struct with fields:

VL: [4976x3 double]
FL: [9968x3 double]
FC: [9968x3 double]
```

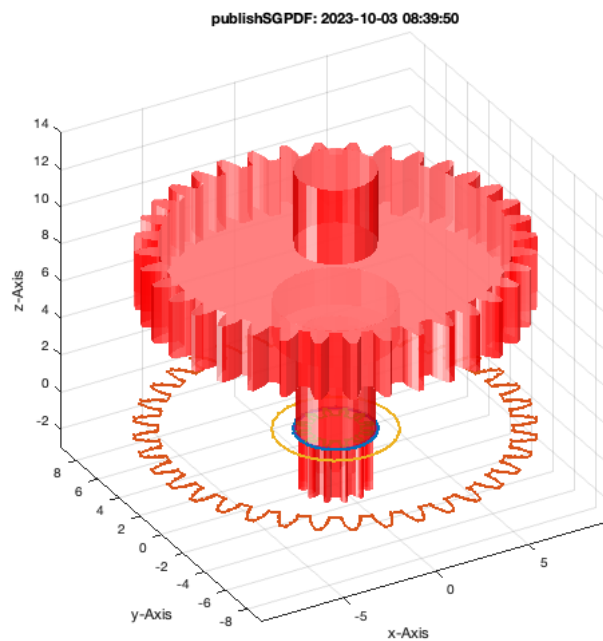


2. Sonnenrad:

```
SGofCPLcommand('c 4,h 4,g 18 36,h 3,c 6,h 2,c 3.8,h 5,g 3.2 12,h 3,mov 0 0 -3')
```

```
SGofCPLcommand: SGofCPLcommand("c 4,h 4,g 18 36,h 3,c 6,h 2,c 3.8,h 5,g 3.2 12,h 3,mov 0 0 -3")
SGofCPLcommand: SGfigureeval('SGofCPLcommand("c 4,h 4,g 18 36,h 3,c 6,h 2,c 3.8,h 5,g 3.2 12,h 3,mov 0 0 -3");');
ans =
struct with fields:

VL: [1478x3 double]
FL: [2936x3 double]
FC: [2936x3 double]
```



3. Umlaufrad (Planetenrad):

```
SGofCPLcommand('g 12 24,c 4.2,h 3,rotz 8,move 0 -15 7')
```

```
SGofCPLcommand: SGofCPLcommand("g 12 24,c 4.2,h 3,rotz 8,move 0 -15 7")
```

```
SGofCPLcommand: SGfigureeval('SGofCPLcommand("g 12 24,c 4.2,h 3,rotz 8,move 0 -15 7");')
```

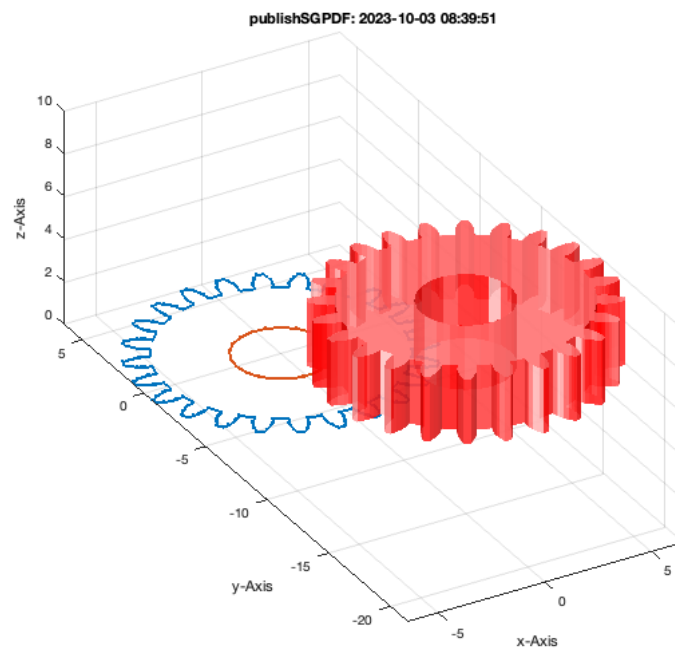
```
ans =
```

```
struct with fields:
```

```
VL: [714×3 double]
```

```
FL: [1428×3 double]
```

```
FC: [1428×3 double]
```



4. Steg für 1 Umlaufrad:

```
SGofCPLcommand('c 6.3,c 10,enter,cp 0 -10.5,b 3.9 13.2,+,h 1.8,enter, cp 0 -15,g 3.2 12,h 2,c 3.8,h 5.2,+,move 0 0 5')
```

```
SGofCPLcommand: SGofCPLcommand("c 6.3,c 10,enter,cp 0 -10.5,b 3.9 13.2,+,h 1.8,enter, cp 0 -15,g 3.2 12,h 2,c 3.8,h 5.2,+,move 0 0 5")
```

```
SGofCPLcommand: SGfigureeval('SGofCPLcommand("c 6.3,c 10,enter,cp 0 -10.5,b 3.9 13.2,+,h 1.8,enter, cp 0 -15,g 3.2 12,h 2,c 3.8,h 5.2,+,move 0 0 5");')
```

```
ans =
```

```
struct with fields:
```

```
VL: [582×3 double]
```

```
FL: [1160×3 double]
```

```
FC: [1160×3 double]
```