*Sage Model Notes*

# RotatingMechanism.scfn

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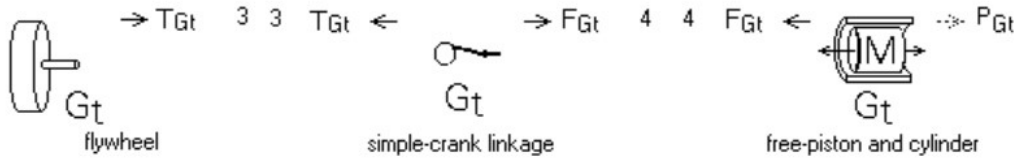
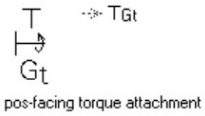
Stirling machine rotating mechanisms are broken down into separate components representing the flywheel, kinematic linkage and reciprocating piston or displacer. This example corresponds to an isolated rotating mechanism. See also the complete engine example AlphaEngineFlywheel.scfn

The root model of this example comprises three components: a flywheel, a simple-crank linkage (or another type of linkage if you prefer and a free-piston and cylinder):



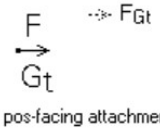

The first two components are available in the Gt Moving Parts page of the component palette and the last component in the Composite page.

**Within the flywheel component** is a pos-facing torque attachment, available in the Mechanical Attachments page of the component palette inside:




It is initially created in an unconnected state (dotted arrow). In the sample model the connection has been moved up to the root level for connection to the simple-crank linkage using the red up-arrow tool in the Sage Toolbar:

**Within the simple-crank linkage** is a pos-facing force attachment, available in the Mechanical Attachments page of the component palette inside:




As above, its connector arrow has been moved up to the root level for connection to the simple-crank linkage.

**Within the free-piston and cylinder component** is a reciprocator component containing the following attachments, available in the Mechanical Attachments page of the component palette inside:


Their connector arrows have been moved up to the root level. The neg-facing attachment for connection to the simple-crank linkage. The pos-facing area $P_{Gt}$ connector arrow remains unconnected in this example. It represents the volume displaced by the reciprocator piston face. In a complete stirling machine model it would be connected to an opposing connection of a gas domain in a variable-volume space (see VariableVolumeSpace.scfn sample model).

# Physics

**The flywheel** component contains an input representing the flywheel moment of inertia.

| | | |
|---|---|---|
| IMoment | flywheel moment of inertia (kg m2) | 1.000E+00 |

**The simple-crank linkage** component contains inputs

| | | |
|---|---|---|
| Rcrank | crank radius (m) | 1.000E-02 |
| Phase | crank angle at time zero (rad) | 0.000E+00 |
| Lratio | Lrod / Rcrank | 2.000E+00 |

It inherits its rotational speed from the `Freq` input of the root level model. Its purpose is to implement the math required to convert a rotary motion into a back-and-forth reciprocating motion.

**The reciprocator** inside the free-piston and cylinder contains an input

| | | |
|---|---|---|
| Mass | reciprocating mass (kg) | 1.000E+00 |

**The torque connection** $T_{Gt}$ solves for the rotation angle $\theta(t)$ common to both flywheel and linkage that makes their torques equal.

**The force connection** $\mathrm{F_{Gt}}$ solves for the displacement $\mathrm{x(t)}$ common to both linkage and reciprocator that makes their boundary forces equal.