



Public Domain Differential

Printable working differential gear model for classroom demos and hands-on mechanical study

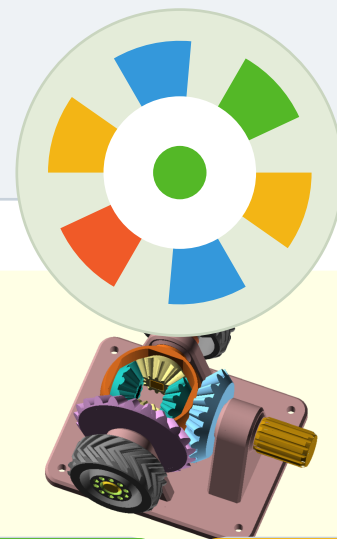
Project Overview

A compact educational model that demonstrates how a differential distributes drive motion across two output wheels. It prints as separate parts, assembles into a working display, and includes the source OpenSCAD script for study or customization.

What it is: a 3D printed differential gear demonstration with a crown gear, drive shaft, wheel axles, and gear carrier.

What it does: turning the drive knob rotates the mechanism and shows how two wheels can stay connected while still rotating at different speeds.

Best use: classroom explanation, engineering demos, desk display, or motion study for gear and drivetrain concepts.



CATEGORY

**Learning
Engineering**

PRINT

**0.16 mm layer
0.4 mm nozzle**

BUILD

**Separate
parts
3 walls**

SUPPORT

**Required
for key
surfaces**

HARDWARE

**No extra parts
Glue helpful**

FORMATS

**3MF / STL /
ZIP
OpenSCAD
source**

Working Demo

Shows how input motion is split through internal gears and transferred to both wheel outputs.

OpenSCAD Source

Includes the script and supporting files so the mechanism can be studied and adjusted in software.

Classroom Friendly

Designed for explanation, bench-top demonstrations, and hands-on learning about drivetrains.

Print Setup

- Print in **PLA+** with **0.16 mm** layer height, a **0.4 mm** nozzle, and **three walls**.
- Test the **drive shaft with knob** and **drive gear** first so the square tip fits correctly.
- Use **Gyroid** or **3D Honeycomb** infill because the axles print vertically.
- A **scarf joint seam** can help keep the axles more round.
- **Support is required** on the marked faces.

Build Notes

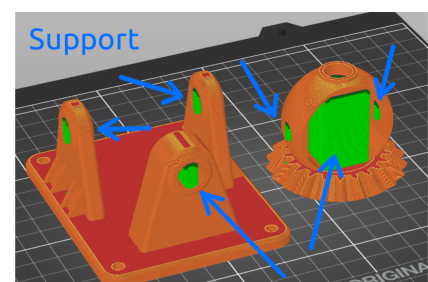
- Use only a **tiny amount of grease** on gears and sliding surfaces.
- The round case may need careful alignment or light help from **pliers**.
- Check wheel orientation before gluing the axle tips.

Project Checklist

<input type="checkbox"/>	No extra hardware	Yes
<input type="checkbox"/>	Glue recommended	Yes
<input type="checkbox"/>	Lubrication	Tiny
<input type="checkbox"/>	Script included	Included

Assembly Workflow

- Build the carrier**
Place the four small gears into the round case, add the mating gears with square holes, and rotate the set into alignment.
- Install the drive side**
Glue the square tip of the drive shaft into the drive gear, then pass the shaft through the support bracket.
- Add crown gear and case**
Position the crown gear with the carrier assembly and confirm smooth gear mesh.
- Fit wheels and finish**
Set the wheel orientation, glue the axle tips into place, and test the mechanism with light lubrication.

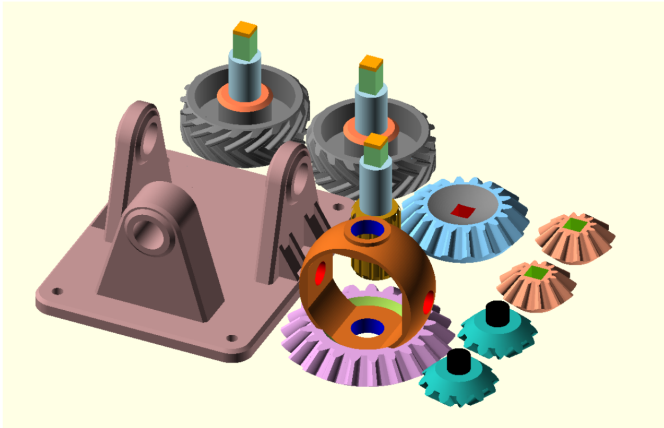


Support layout for the carrier and base parts.

Quick Summary

A printable differential that makes wheel-speed difference and drive transfer easy to see.

Exploded View



Separated printable parts view of the differential set and supporting frame.

Files Included

- **public-domain-differential.3mf**
Separated parts for the intended print workflow
- **public-domain-differential.stl**
Model export for slicers that split parts
- **public-domain-differential.zip**
OpenSCAD source, dependencies, and customizer files

OpenSCAD and Customizer

- Unpack **public-domain-differential.zip** and keep the included files together in one folder.
- Use **OpenSCAD 2024** with optimizations turned on when possible.
- Customizer modes let you view the model **assembled** or as **separated printable parts**.
- Tolerances and a few print-related settings can be adjusted, but the design is **not fully customizable**.

Practical Notes

- Use only a **very small amount of grease**; a lightly wiped cotton swab is enough.
- The bevel gears are demonstration-friendly approximations, not true bevel gears.
- Tolerances have not been broadly tested across every slicer profile.
- Assembly of the small gears inside the case may take a little patience.

Short Description

A working educational differential model that demonstrates how one input can drive two outputs while allowing different wheel speeds. **License:** Public Domain.