



# Gears App

Learn the User Interface

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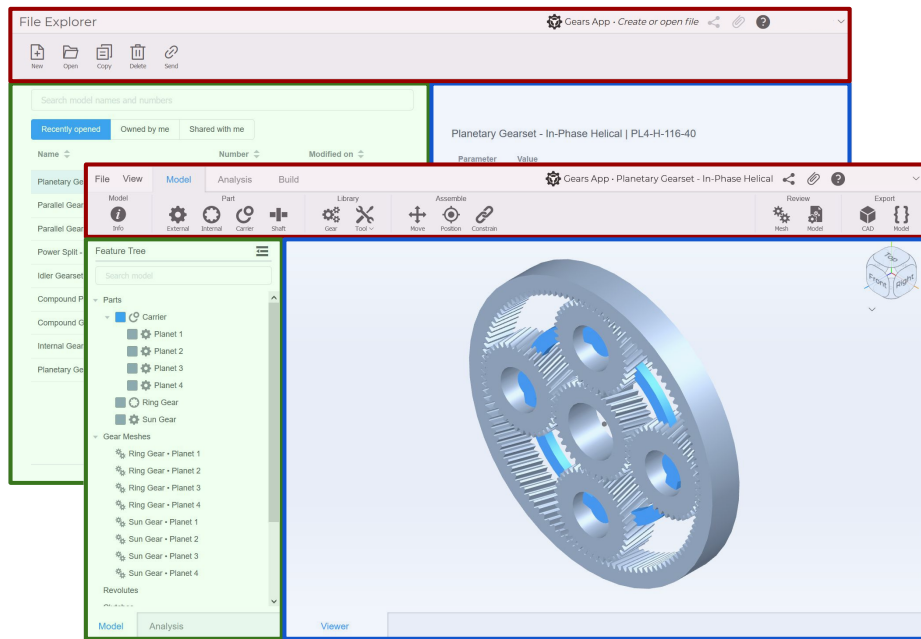
# Overview

Learn how to navigate the fully web-based interface of the Gears App, including tips for quickly modeling and reviewing complex gear systems.

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**TIP:** Firefox or Chrome internet browser is recommended.



VIEWS

# Views

1. **Explorer** - Gears App landing page. Lists any existing models. Create, open, copy, and delete models from this view.
2. **Model** - Define a system of gears defined in three-dimensional space, including gear geometry, constraints, and load cases. Review gear mesh and system kinematics and powerflow.
3. **Release** - Same as *Model* view, but for released model versions.

# Explorer

Ribbon

Models

Model Info

File Explorer

Gears App · Create or open file

New

Open

Copy

Delete

Send

Search model names and numbers

Recently opened

Owned by me

Shared with me

Name	Number	Modified on
Planetary Gearset - In-Phase Helical	PL4-H-116-40	12/22/2020, 8:17:47 AM
Parallel Gearset - Spur	PAR-S-001	2/3/2021, 2:34:27 PM
Parallel Gearset - Helical	PAR-H-001	2/3/2021, 11:53:19 AM
Power Split - External Helical Gears		2/2/2021, 2:20:53 PM
Idler Gearset - Helical		2/2/2021, 2:20:53 PM
Compound Planetary Gearset	CMP-PL3-H	1/20/2021, 2:44:12 PM
Compound Gearset - Helical	CMP2-H-001	1/6/2021, 8:08:57 AM
Internal Gearset - Helical	INT-H-001	12/28/2020, 10:45:24 AM
Planetary Gearset - Helical	PL3-H-001	1/7/2021, 9:43:30 AM

Planetary Gearset - In-Phase Helical | PL4-H-116-40

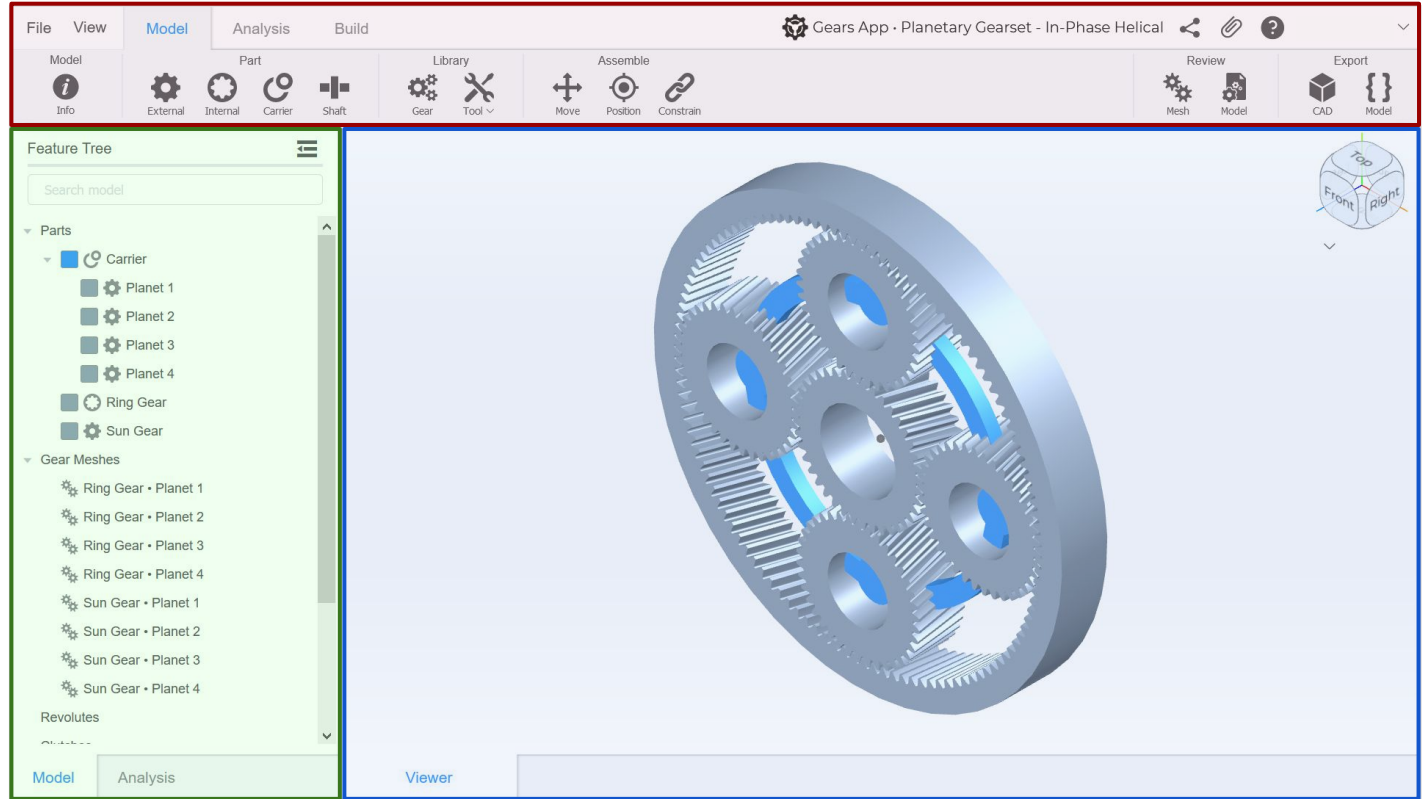
Parameter	Value
Description	In-phase planetary gearset with 4-planets, 116 ring teeth, and 40 sun teeth.
Created on	12/22/2020, 8:03:33 AM
Created by	Chad Glinsky
Modified on	12/22/2020, 8:17:47 AM
Modified by	Chad Glinsky
Owner	Chad Glinsky
Lock	Off
Versions	<div>Load release table</div>
Preview	Model Preview Unavailable

# Model

## Ribbon

## Feature Tree

## 3D Viewer

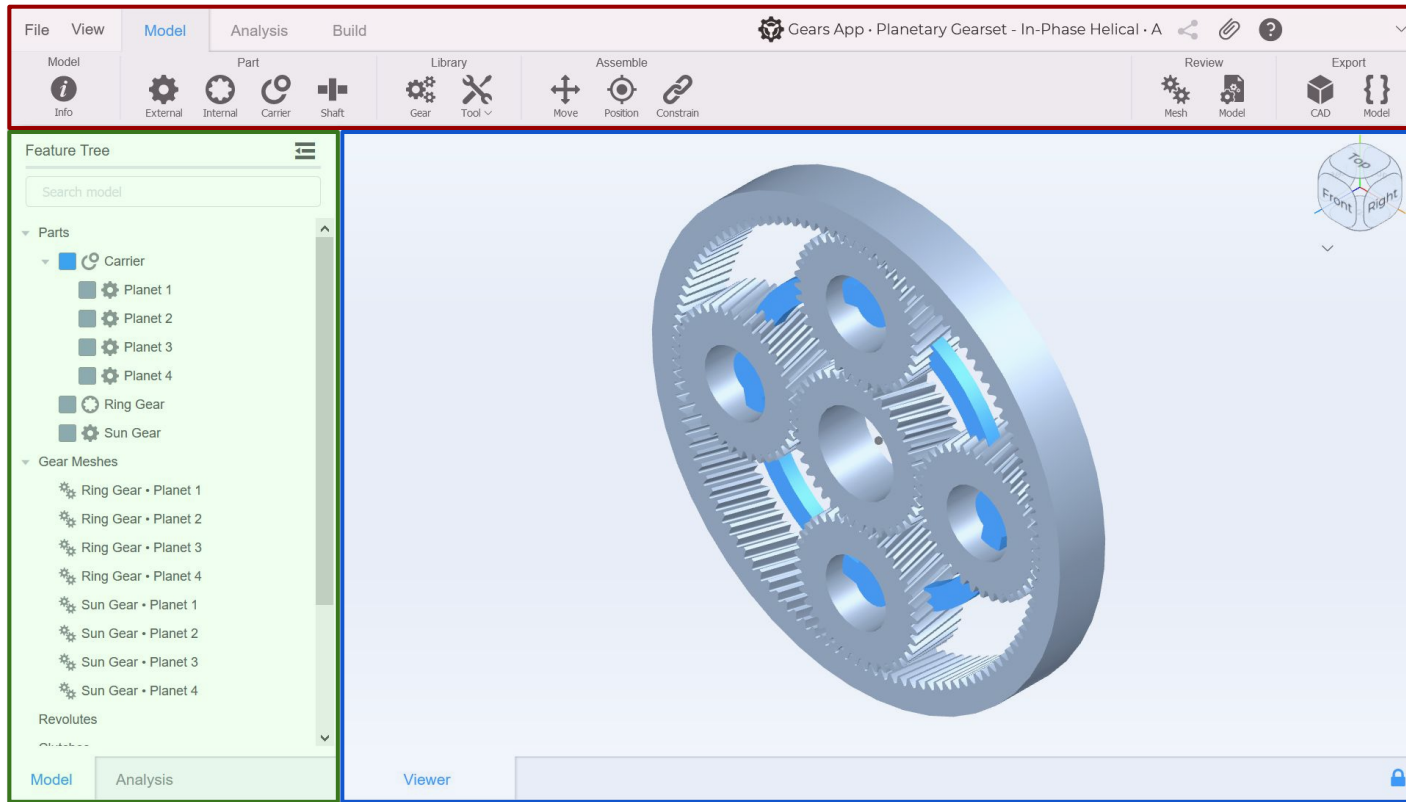


# Release

**Ribbon**

**Feature Tree**

**3D Viewer**



MODEL



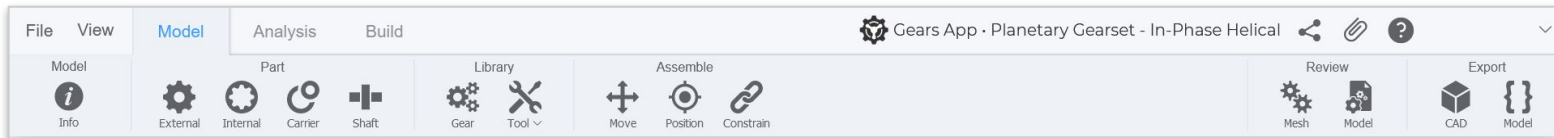
# Ribbon

This is organized into three tabs, defining a natural workflow to *Model*, *Analyze*, and *Build* gear systems. Each tab divides its functionality between the left and right side.

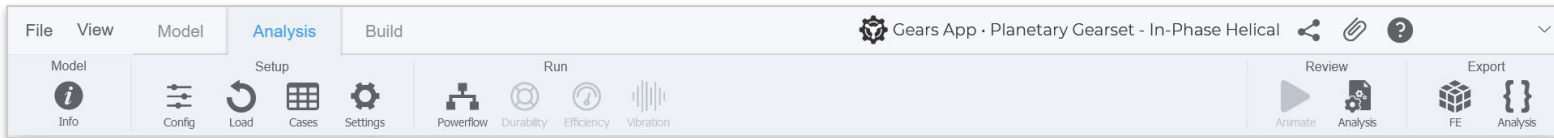
The left side of the ribbon has functionality to *create & modify* the model.

The right side of the ribbon has functionality to *review & export* the model.

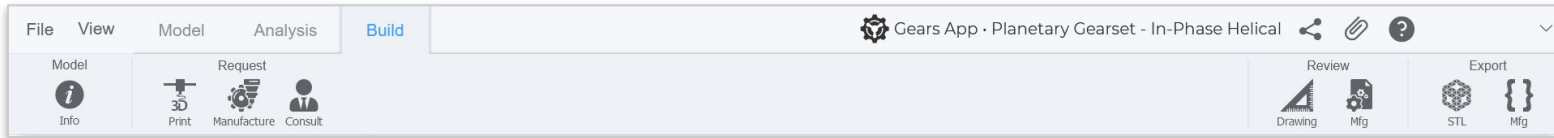
## MODEL



## ANALYSIS



## BUILD



# Feature Tree

This is organized into two tabs, defining a natural hierarchy to manage data for *Model* and *Analysis*.

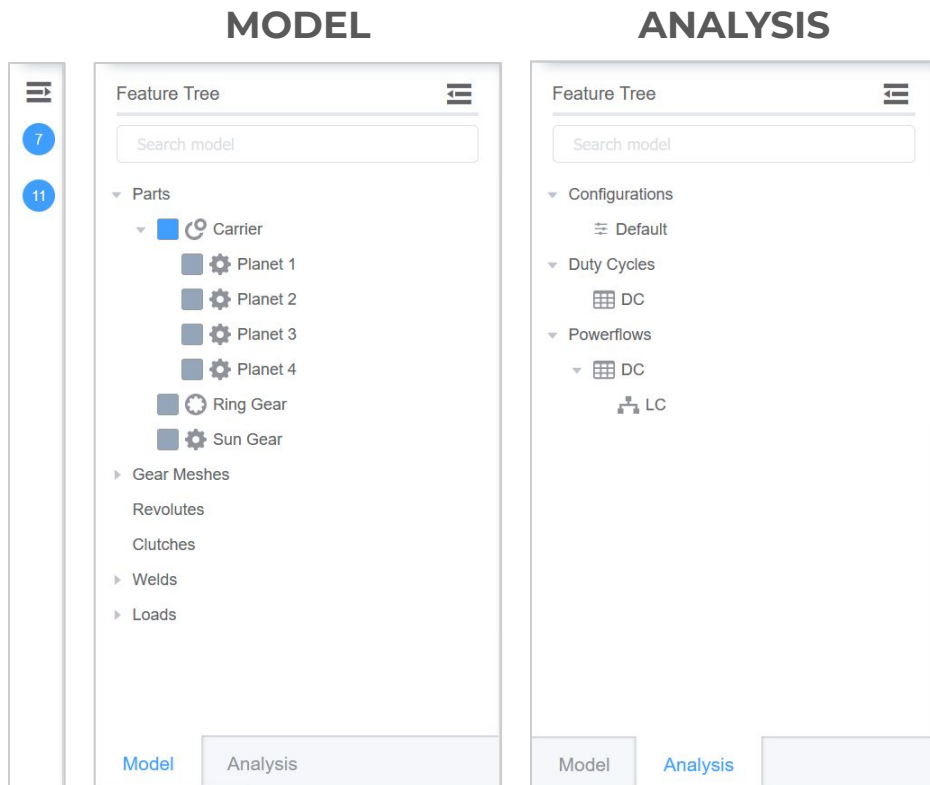
Its *Model* tab displays all parts, constraints, and loads present in the model.

Its *Analysis* tab displays all configurations, duty cycles, and load cases.

**TIP:** Hide the Feature Tree to expand the 3D Viewer and see the number of parts and constraints.

**TIP:** Add gears to the reference frame of a shaft or carrier by drag-and-drop in the Feature Tree.

**TIP:** Right-click items in the Feature Tree to access the relevant modeling features for that item.



# 3D Viewer

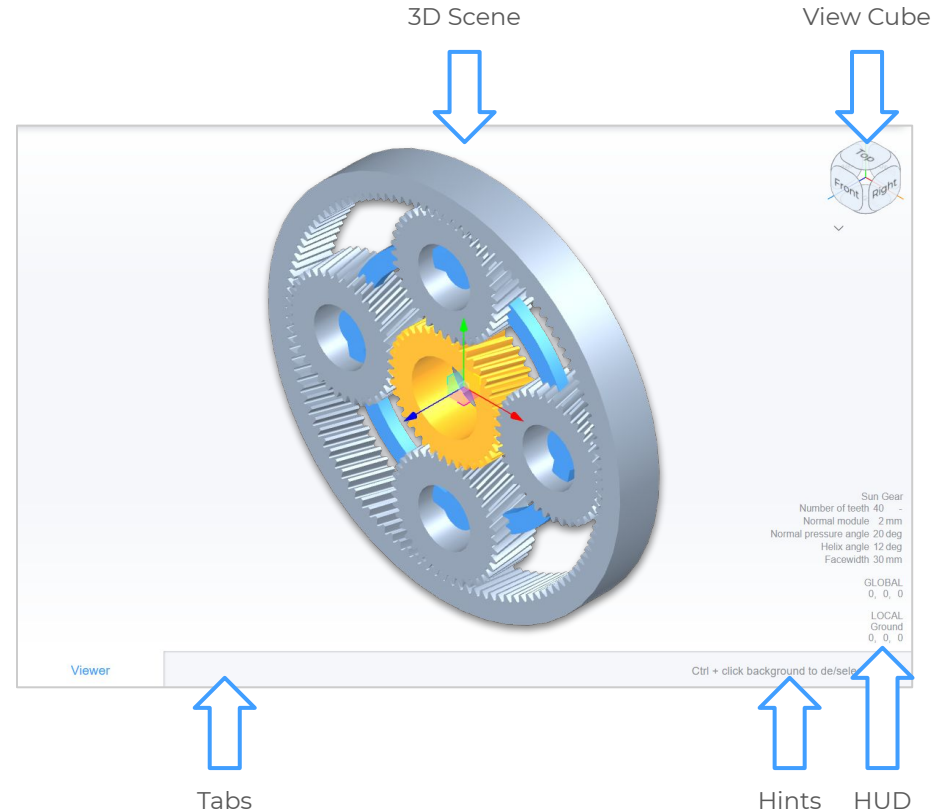
This large area of the interface provides accurate three-dimensional rendering of the gear system.

Rotate, zoom, and pan the scene and specify exact views with the View Cube.

Interactively edit a model with various mouse click events.

Interactively review model data with the Heads Up Display (HUD) in the lower right.

**HINT:** Tabs are dynamically created in the area of the 3D Viewer to model parts, review gear mesh, reports, etc.



# Modelers

Modelers exist to interactively model specific items. Below are the modelers for parts.

\*Carrier Modeler not shown here.

## EXTERNAL GEAR

The External Gear Modeler interface features a top section with 'Name' and 'Number' input fields, and a 'Description' text area. Below this is a 'Geometry' section with a 'Tooth Form' toggle set to 'Tooling'. The 'Geometry' section contains two columns of parameters: Module (2 mm), Pressure angle (20 deg), Helix angle (0 deg), Number of teeth (20), Profile shift coeff. (0), Pre-finished  $t_{p1}$  (3.1415926535 mm), Root diameter (34.999999999 mm), Tip diameter (43.999999999 mm), Bore diameter (0 mm), Work piece dia. (45 mm), and Facewidth (10 mm). A 'Cutter Data' section includes 'Cutting method' (Generating  $\pi$ ), 'Get tool data' (Select tool), 'Pressure angle  $\alpha_p$ ' (20 deg), 'Addendum coeff' (1.25), and 'Dedendum coeff' (1.0). A 'Viewer' button and a 'Gear' icon are at the bottom. The right side shows a 3D model of the gear teeth in a 'Transverse plane' view.

## INTERNAL GEAR

The Internal Gear Modeler interface is similar to the External Gear Modeler. It has 'Name' and 'Number' input fields, a 'Description' text area, and a 'Geometry' section with a 'Tooth Form' toggle set to 'Tooling'. The 'Geometry' section parameters are: Module (2 mm), Pressure angle (20 deg), Helix angle (0 deg), Number of teeth (50), Profile shift coeff. (0), Pre-finished  $t_{p1}$  (3.1415926535 mm), Root diameter (105.000000000 mm), Tip diameter (96.000000000 mm), Rim diameter (120 mm), Work piece dia. (95 mm), and Facewidth (10 mm). The 'Cutter Data' section includes 'Cutting method' (Generating  $\pi$ ), 'Get tool data' (Select tool), 'Pressure angle  $\alpha_p$ ' (20 deg), 'Number of teeth' (31), 'Addendum coeff' (1.25), and 'Dedendum coeff' (1.0). A 'Viewer' button and a 'Gear' icon are at the bottom. The right side shows a 3D model of the internal gear teeth in a 'Transverse plane' view.

**HINT:** Every gear created is automatically added to the Gear Library, an organization-wide collection of gears.

# Modelers

Below are the modelers for gearing data.

## MATERIAL & QUALITY

Properties | Sun Gear

**Ferrous Material** ✓ ANSI/AGMA 2001-D04 >

**Flank Quality** ✓ ANSI/AGMA ISO 1328-1-B14 >

Tolerance class

4

**Radial Quality** ✓ ANSI/AGMA 2015-1-B15 >

Figure 2 - Pitch deviations

Parameter	Value	Units
Tolerance class	4	-
Number of pitches in sector	3	-
Single pitch tolerance	4.1	um
Cumulative pitch tolerance	12	um
Sector pitch tolerance	9	um
Adjacent pitch difference tolerance	6	um

Viewer Sun Gear x

Gear quality per ANSI/AGMA ISO 1328-1-B14

## MICROGEOMETRY

Microgeometry | Sun Gear

Amount	Type	Start	End
Profile slope	10 um Linear	20 %	80 %
Profile crown	10 um Parabolic	20 %	80 %
Root relief	40 um Parabolic	20 %	%
Tip relief	20 um Parabolic	80 %	%

Amount	Type	Start	End
Lead slope	10 um Linear	20 %	80 %

Amount	Type	Start	End
Profile slope	10 um Linear	20 %	80 %
Profile crown	5 um Parabolic	20 %	80 %
Root relief	10 um Parabolic	20 %	%
Tip relief	10 um Parabolic	80 %	%

Amount	Type	Start	End
Lead slope	-10 um Linear	20 %	80 %

Viewer Sun Gear x

**HINT:** Gear properties and microgeometry apply at the library-level, i.e. all instances of the gear.

# Modelers

Below are the modelers for tooling data.

\*Basic Rack Modeler not shown here.

## HOB

**Hob Modeler**

Name:  Number:

Description:

**Geometry**

Module<sub>n</sub>:  mm Pressure angle<sub>n</sub>:  deg

Addendum coeff.:  Dedendum coeff.:

Protuberance size<sub>n</sub>:  mm Protuberance ang<sub>n</sub>:  deg

Tip radius coeff.:  Max tip radius: ☐

Geometry:

File:

Viewer: ☒ Hob

## SHAPER

**Shaper Modeler**

Name:  Number:

Description:

**Geometry**

Module<sub>n</sub>:  mm Pressure angle<sub>n</sub>:  deg

Helix angle:  deg Number of teeth:

Addendum coeff.:  Dedendum coeff.:

Profile shift coeff.:  Protuberance size<sub>n</sub>:  mm

Tip radius coeff.:  Max tip radius: ☐

**Computed Tooth Form**

Root diameter:  mm Tip diameter:  mm

Tooth thickness<sub>n</sub>:  mm

Notes:

Viewer: ☒ Shaper

**HINT:** Every tool created is automatically added to its Tool Library, an organization-wide collection of tools.

# What Next?

- Sign up and start using [Gears App](#).
- Keep learning with the [Tutorial Series](#).