



Gears App

Model Data and Exports

<https://drivetrainhub.com>

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MODEL DATA

TOOLING, GEOMETRY, ASSEMBLY, MATERIALS, TOLERANCES, ATTACHMENTS

About Tooling

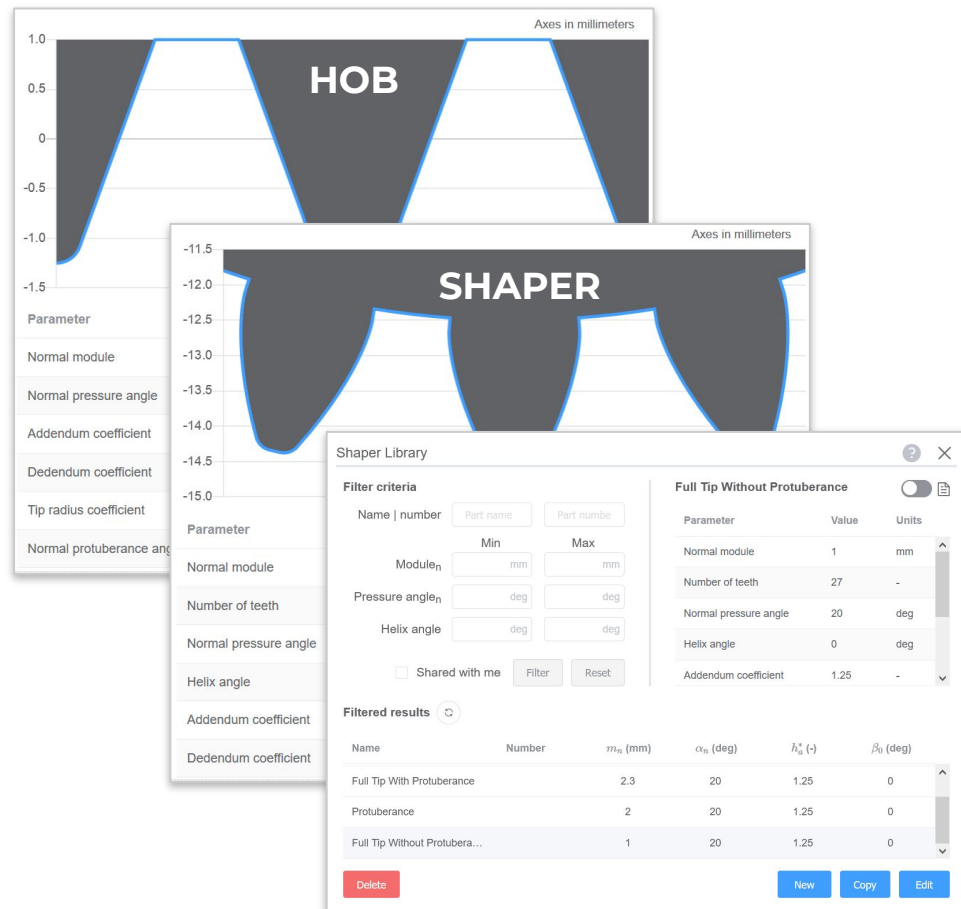
Gear cutting tools can be modeled and shared throughout your organization.

Hobs, shapers, and basic racks can be modeled and applied to generate pre-finished gear geometry.

Cutters can optionally have *protuberance*, resulting in finishing stock on gear flanks.

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

TIP: Streamline your gear modeling by choosing a library tool to define cutter data in the Gear Modeler.



Manage Tools

1. To view your organization's collection of tools, hover **Tool** from **Model** ribbon.
2. Choose a tool type from the menu to open its **Tool Library** dialog.
3. Search tools by using *filter criteria*.
4. Preview a tool by clicking it in table.
5. Use buttons along the bottom to create, copy, edit, and delete tools.

The screenshot shows the software interface with the 'Model' ribbon selected. The 'Tool' button in the 'Library' group is highlighted with a blue circle. Below it, the 'Hob Library' dialog is open, displaying filter criteria and a table of tool types.

Hob Library

Filter criteria

Name | number Part name Part number

Module_n Min Max

Pressure angle_n deg deg

Addendum coeff.

☐ Shared with me Filter Reset

Type C Standard Rack ☐

Parameter	Value	Units
Normal module	2	mm
Normal pressure angle	20	deg
Addendum coefficient	1.25	-
Dedendum coefficient	1	-
Tip radius coefficient	0.25	-

Filtered results

Name	Number	m_n (mm)	α_n (deg)	h_a^* (-)	h_f^* (-)
Type B Standard Rack		2	20	1.25	1
Type C Standard Rack		2	20	1.25	1
Type A Standard Rack		2	20	1.25	1

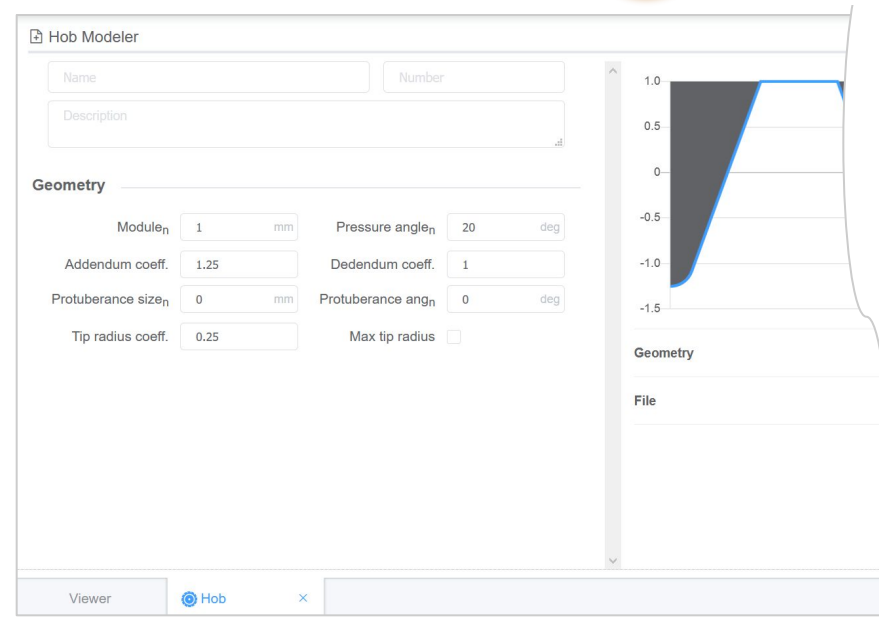
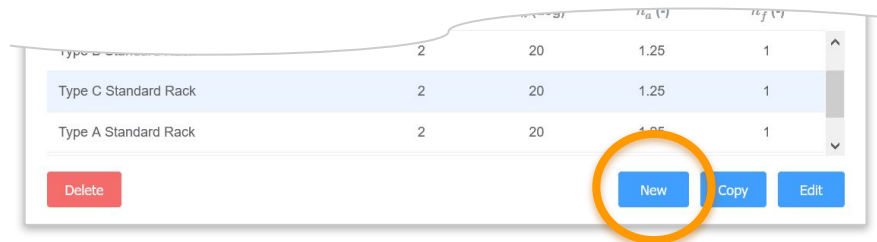
Delete **New** **Copy** **Edit**

Create Tool

1. To create a new tool, click **New** from the **Tool Library** of choice.
2. A new **Tool Modeler** tab will open.
3. Input geometry data to interactively define the cutter design with an accurate 2D rendering.
4. Save the gear (✓) or cancel (✗).

TIP: Shortcut keys include **Ctrl + Enter** to save the tool or **Ctrl + Delete** to cancel without saving.

HINT: By default, a new tool is locked and not shared with any users. To unlock or share, it must be edited afterwards.



About Geometry

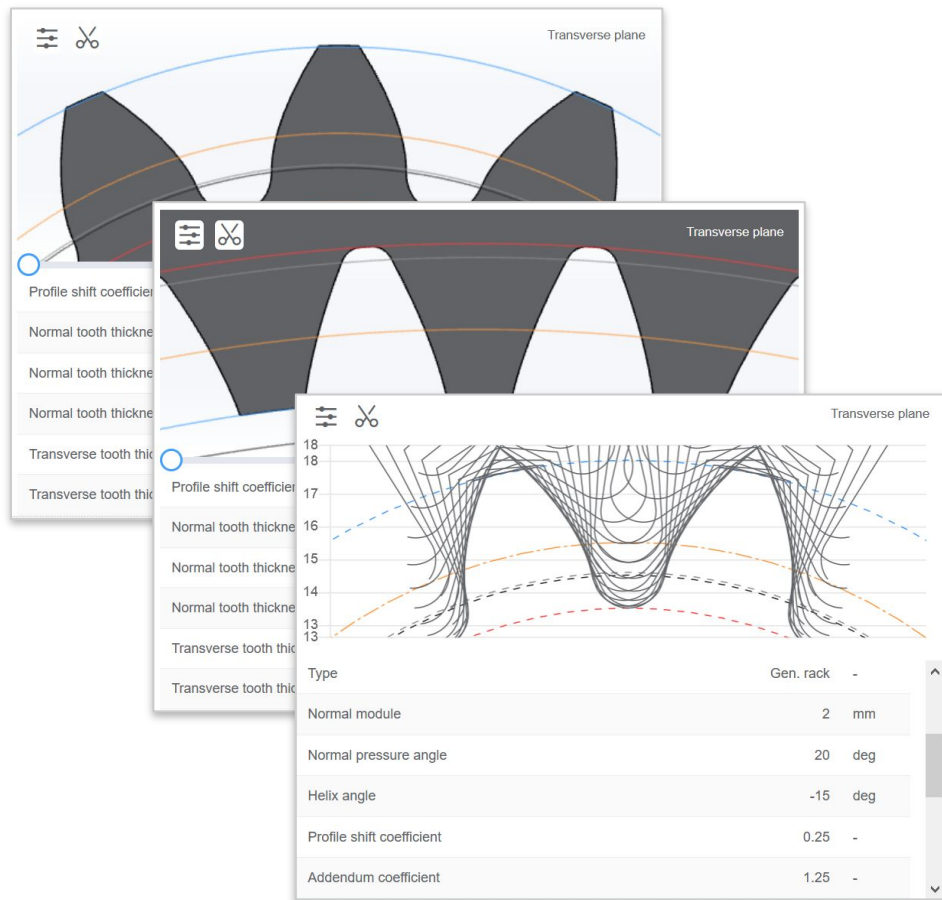
Gears can be modeled and shared throughout your organization.

Spur and helical gears can be modeled with **external and internal** teeth.

Geometry is defined for pre-finished and finished gear teeth, including microgeometry modifications.

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

TIP: Reduce build costs by designing gears with readily available cutters from a trusted gear manufacturer.



Manage Gears

1. To view your organization's collection of gears, click **Gear** from **Model** ribbon.
2. **Gear Library** dialog will open with options to filter and preview gears.
3. Search gears by using *filter criteria*.
4. Preview a gear by clicking it in table.
5. Use buttons along the bottom to create, copy, edit, and delete gears.

HINT: To create a new gear *without* adding it to a model, click **New** in the **Gear Library**.

Filter criteria

Name | number Part name Part number

Module_n Min Max mm

Pressure angle_n deg deg

Helix angle deg deg

☐ Shared with me




Helical Pinion ☐

Parameter	Value	Units
Number of teeth	15	-
Normal module	2	mm
Normal pressure angle	20	deg
Helix angle	-15	deg
Facewidth	20	mm

Filtered results

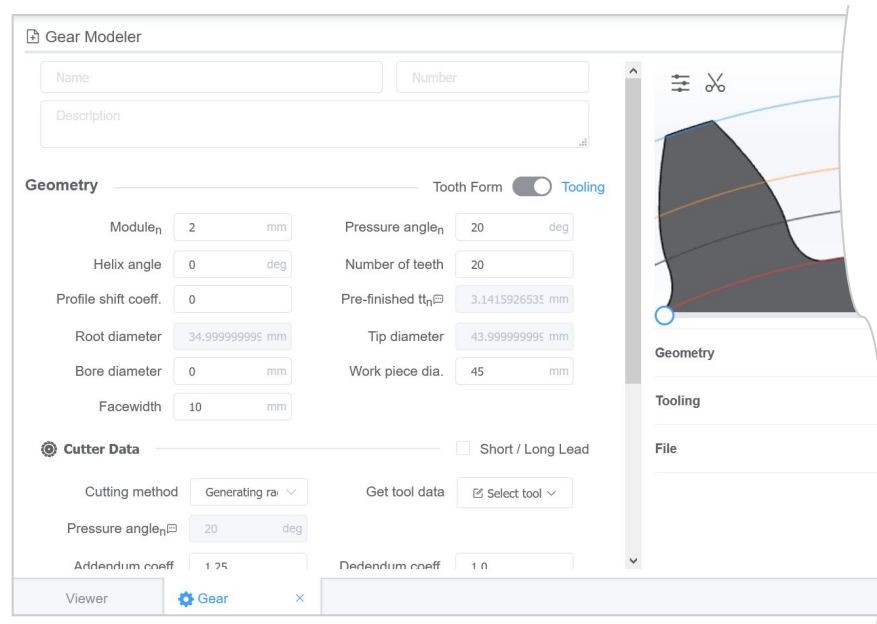
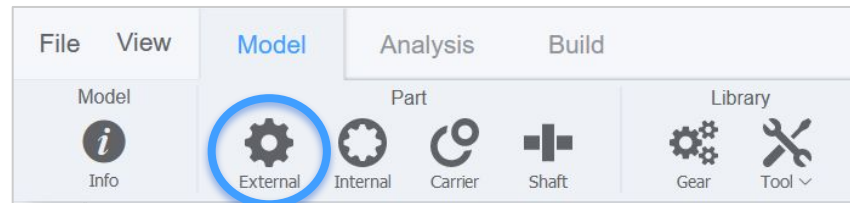
Name	Number	z (-)	m _n (mm)	α _n (deg)	β (deg)
Helical Wheel		28	2	20	15
Helical Pinion		15	2	20	-15
Sun Gear	CMP-PL3-H	20	2	20	20

Create Gear

1. To create a new gear, click **External** or **Internal** from the **Model** ribbon.
2. A new **Gear Modeler** tab will open.
3. Input geometry and cutter data to interactively define the gear design with an accurate 2D rendering.
4. Click  for cutter generation diagram.
5. Save the gear () or cancel ().

TIP: Shortcut keys include **Ctrl + Enter** to save the gear or **Ctrl + Delete** to cancel without saving.

HINT: By default, a new gear is not shared with any users. To share a gear, it must be edited after it is created.



Assembly

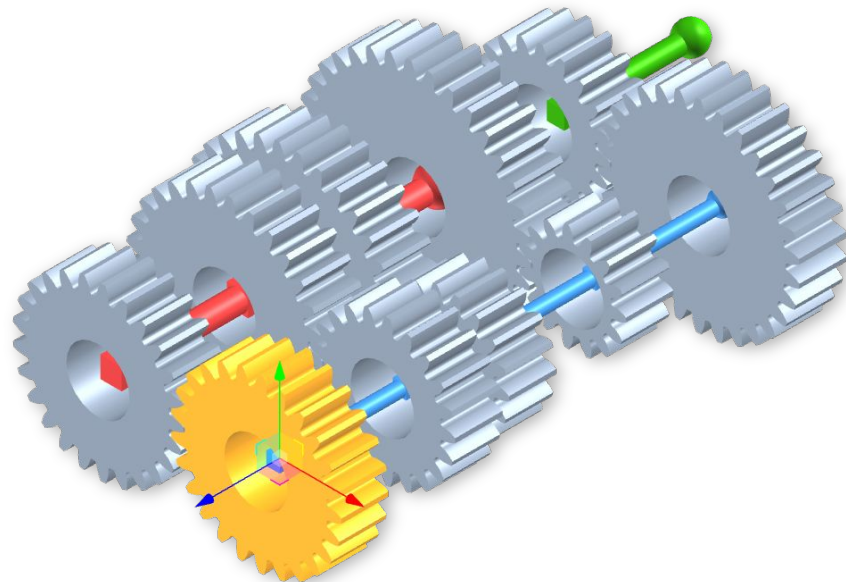
Systems of gears can be modeled and shared throughout your organization.

Position and constrain multiple gears in three-dimensional Euclidean space, with accurate rendering and rich interactivity.

HINT: Every component is considered to be rotationally unconstrained unless specified otherwise.

HINT: Spatial positioning and constraints of an entire model can be defined via the 3D Viewer & Feature Tree.

NOTE: Gears App is designed to easily model complex gear systems without detailed shafts or bearings.



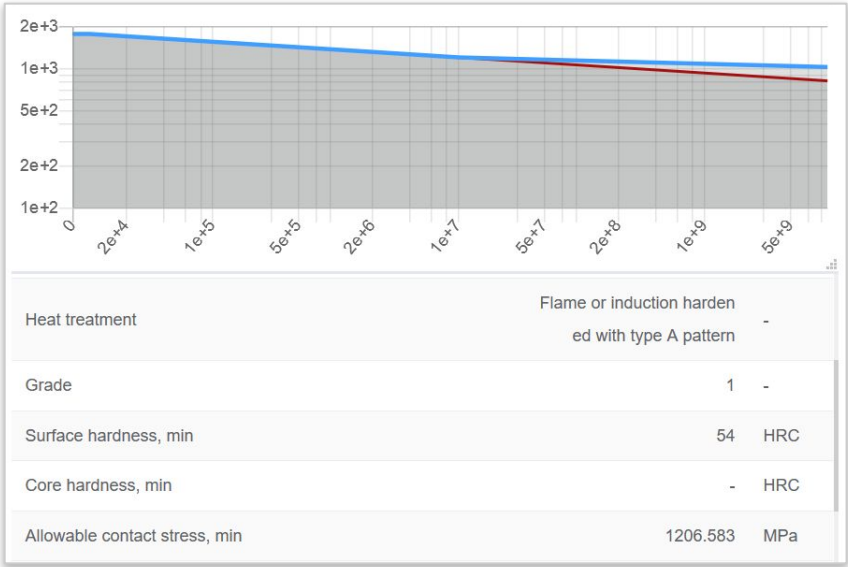
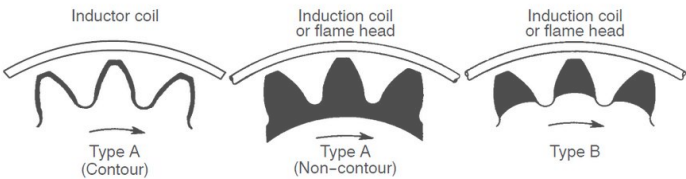
Materials

Gear materials that meet manufacturing requirements are embedded in the Gears App.

Material data per AGMA and ISO standards, including allowable contact and bending stresses.

Stress-cycle (SN) curves computed for gears with specified material, quality grade, heat treatment, and hardness.

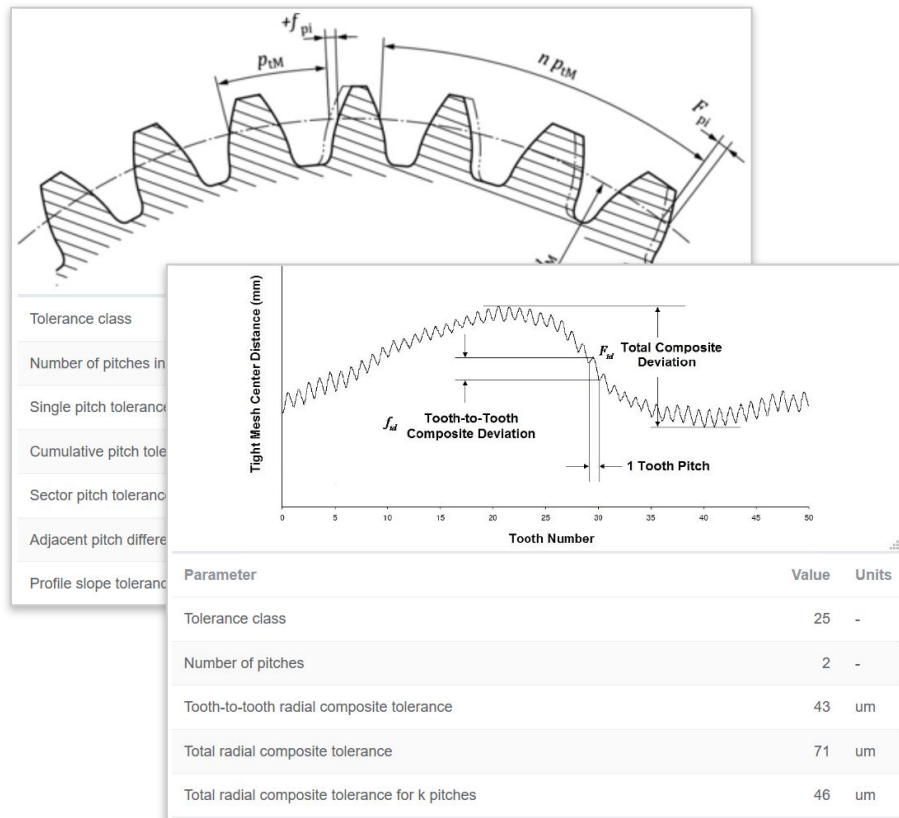
TIP: Assign gear material by right-clicking a gear in the Feature Tree or 3D Viewer and selecting Properties.



Tolerances

Gear tolerances to use with manufacturing quality requirements are embedded in the Gears App.

Geometric tolerances are computed per AGMA and ISO standards for tooth flank and radial values.



TIP: Assign gear tolerances by right-clicking a gear in the Feature Tree or 3D Viewer and selecting *Properties*.

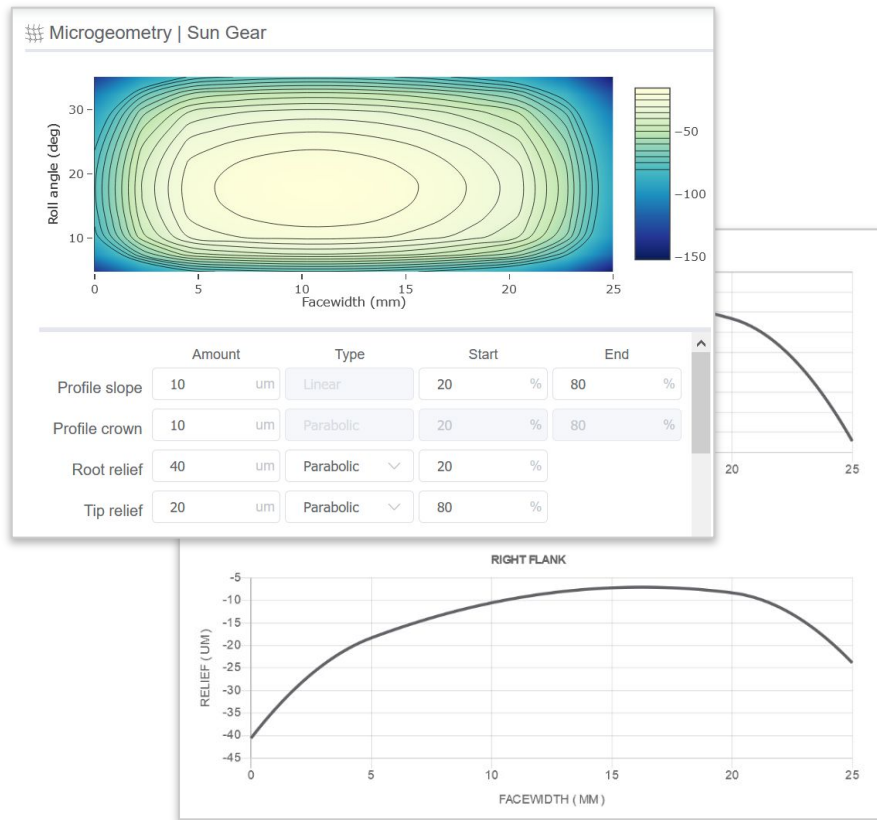
Microgeometry

Gear microgeometry can be modeled and shared throughout your organization.

Tooth flank modifications are integrated with manufacturing drawings and finite element models for an efficient workflow.

TIP: Assign microgeometry by right-clicking a gear in the Feature Tree or 3D Viewer and selecting *Microgeometry*.

NOTE: Bias modification, or flank twist, is currently not supported in the Gears App. It is less common in practice.



Attachments

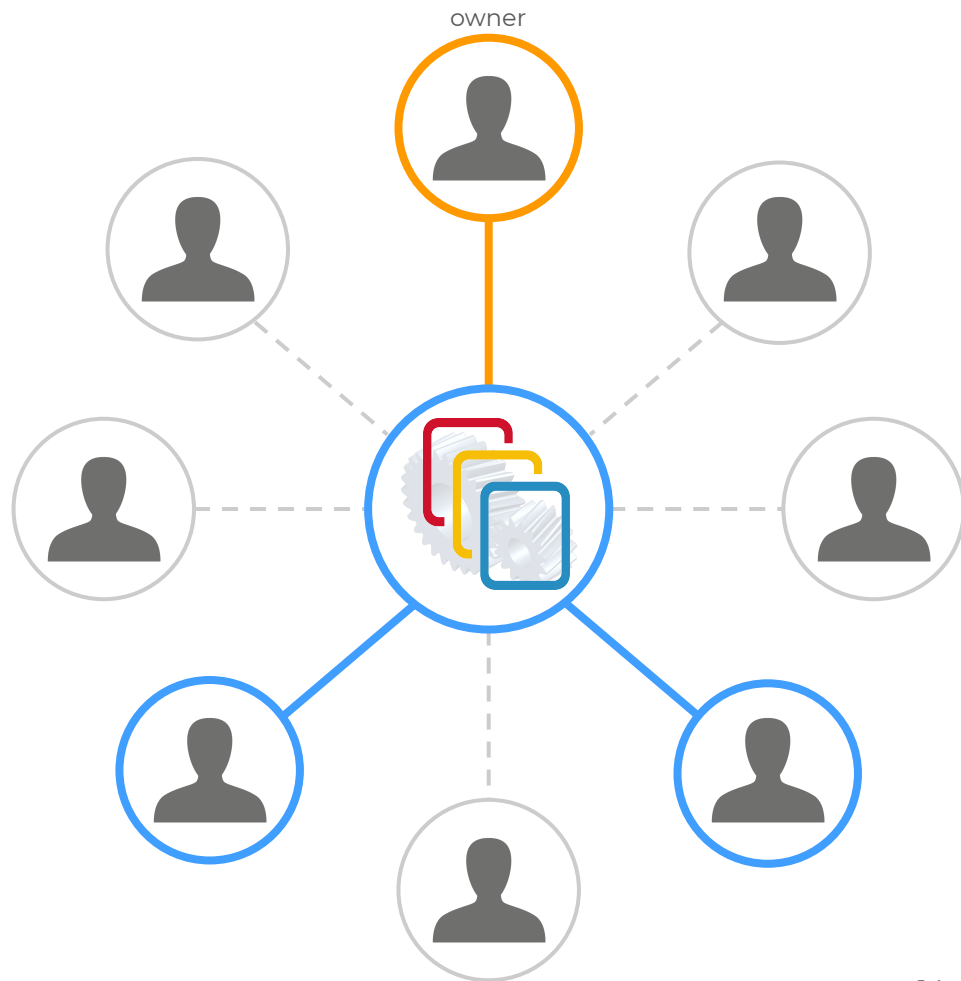
Files can be attached to models and shared throughout your organization.

Reduce miscommunications by attaching relevant gear design data.

Common use cases:

1. Attach an internal code or batch script that uses exported data from Gears App to compute metrics.
2. Attach files or reports from inspections or other software.

TIP: Tags can be used to categorize file attachments.



EXPORT DATA

CAD PARTS, FE MODELS, 3D PRINTS, DRAWINGS, RAW DATA

CAD Parts

Highly accurate 3D manufactured gear geometry can be exported to CAD.

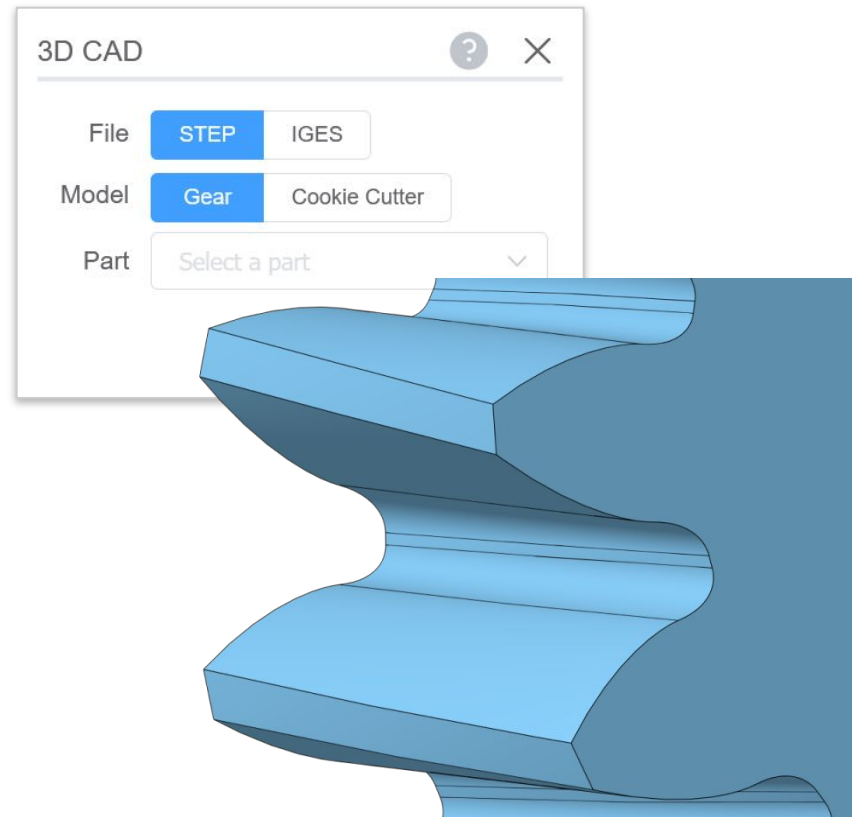
Export gear and cookie cutter models in neutral file formats.

Click **CAD** in **Model** ribbon to open the dialog, then select a part to export.

TIP: Export CAD by right-clicking a gear in the Feature Tree or 3D Viewer and selecting *Export CAD*.

NOTE: Gears App implements a low-level custom CAD engine to produce the most accurate geometry possible.

NOTE: Gear tooth microgeometry is unavailable for CAD exports due to limitations in how CAD represents surfaces.



FE Models

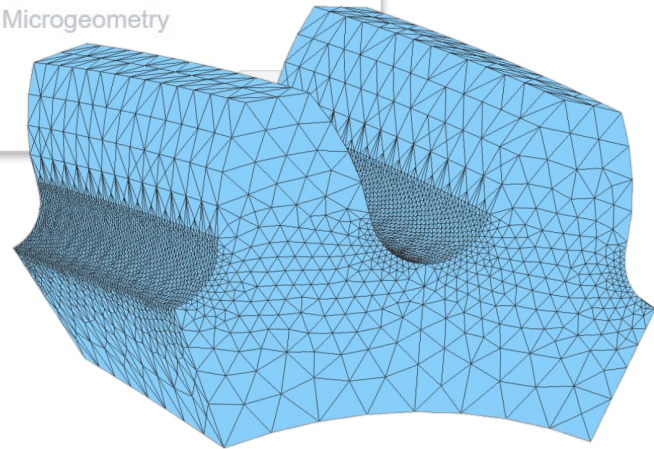
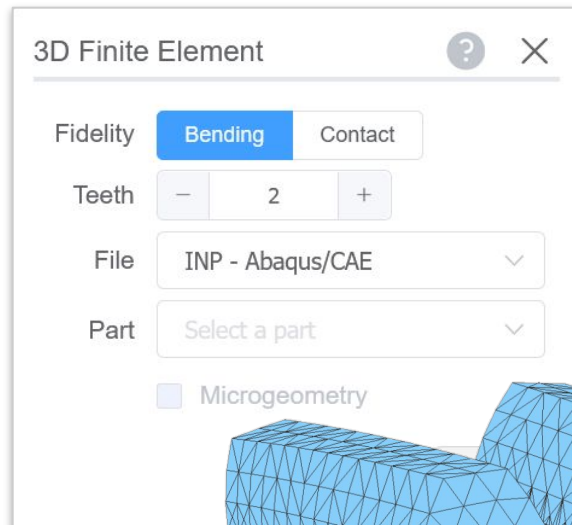
Highly accurate 3D manufactured gear geometry can be exported to Finite Element (FE) models.

Optimized meshes are available in two purpose-built fidelities: 1) **bending** for root stress analysis and 2) **contact** for flank contact analysis, optionally with micro.

File formats are supported for open source and proprietary software packages.

HINT: FE model of gear teeth can be exported with 1-3 teeth only. This is to simplify model setup and solve time.

NOTE: Gears App does not provide a solver for finite element analysis, but users may find open source options.



3D Prints

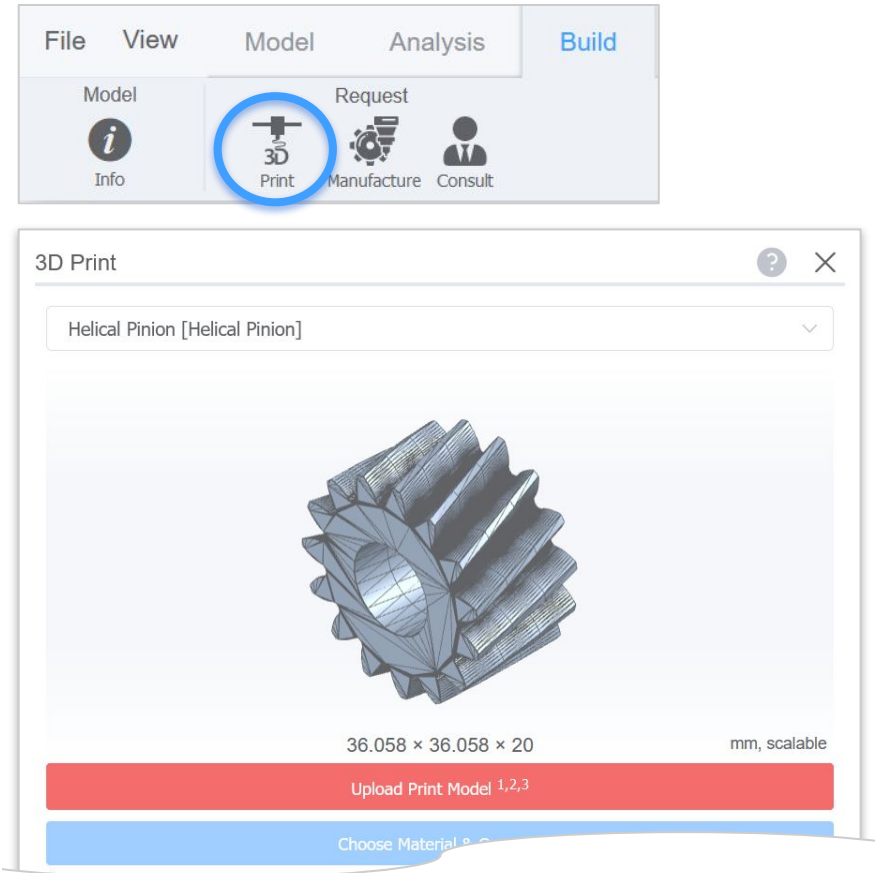
Gears App embeds professional additive manufacturing services, allowing users to easily order 3D prints with fast delivery.

Tessellated models required by 3D printers are derived from the accurate gear geometry in Gears App.

Several materials are available for order, including Nylon and Brass.

HINT: Have a 3D printer? STL and OBJ file exports are available for all gear types from the Build ribbon.

NOTE: Gear tooth microgeometry is excluded from 3D prints due to limitations in printing accuracy.



Drawings

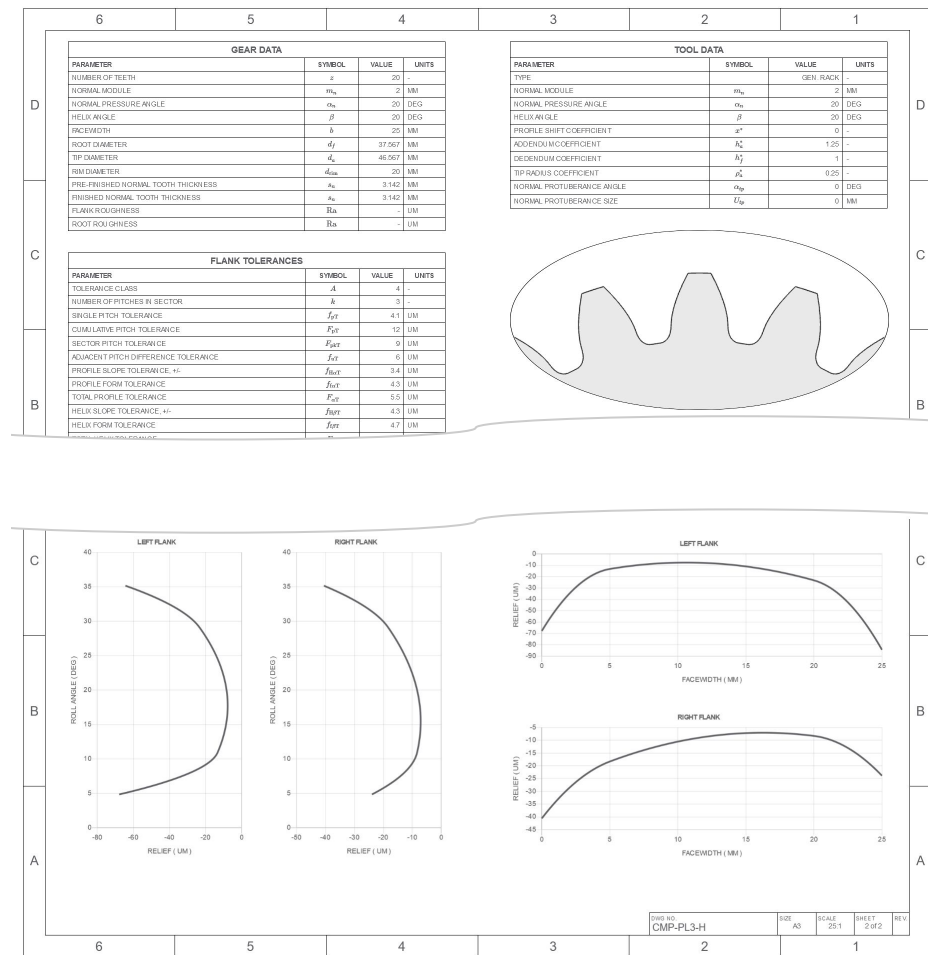
Drawings with specifications for tooling, geometry, microgeometry, material, and tolerances can be auto-generated.

Drawing tables and figures are linked to modeling data, eliminating user error and reducing time spent on translating data.

Globally source your gears with trusted gear manufacturers from the Gears App.

HINT: Profile and lead modification plots are interactive, with mouse hover displaying coordinates.

NOTE: Gear drawings exclude detailed geometry for the blank or web. Only a bore or rim size is specified.

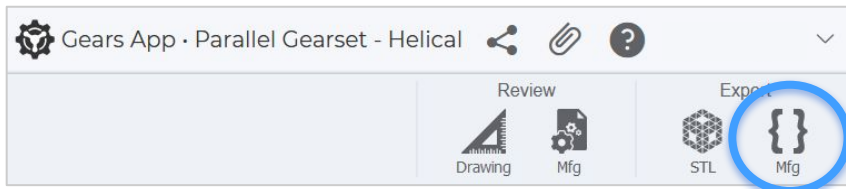
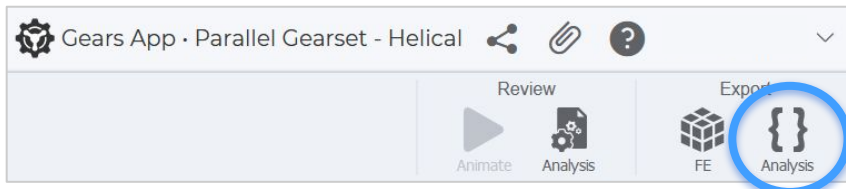


Raw Data

Need raw data to use outside the Gears App, e.g. to run analysis in other software?

Model, analysis, and manufacturing data can be exported to JSON files.

To export raw data, select the relevant ribbon button as shown here.



TIP: Export model data by right-clicking a gear in the Feature Tree or 3D Viewer and selecting *Export data*.

INTEGRATIONS

CONSULTING & MANUFACTURING

Design Review

Need an expert to review your design?

Learn how to request services to conduct a design review with independent consultants from our global network at Drivetrain Hub.

See tutorial: *Consulting and Manufacturing*

Manufacturing

Need to build your gear system?

Learn how to create mockups with our additive manufacturing service, and efficiently communicate with qualified global manufacturers to prototype and mass produce your gears.

See tutorial: *Consulting and Manufacturing*

What Next?

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