



# Gear Overview



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# Catalog

- 01** Spur Gear
- 02** Helical Gear
- 03** Straight Bevel Gear
- 04** Spiral bevel gear
- 05** Worm Gear Set
- 06** Sprocket
- 07** Internal gear

## 1. Spur Gear

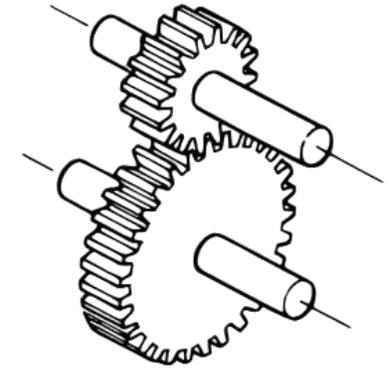
It is the most common and simplest type of gear, with its tooth surfaces parallel to the gear axis and its tooth profile arranged in a straight line. It is mainly used for power transmission between parallel shafts.

### Features:

- Simple structure: Relatively easy to manufacture and install, with low cost.
- High transmission efficiency (up to 98% or more), suitable for high-speed transmission.
- High noise level: Direct tooth meshing can easily generate impact and vibration.
- No axial force (suitable for parallel shaft transmissions, not suitable for crossed shafts).

### Applications:

- For general power transmission



## 2. Helical Gear

Helical gears have angled teeth (a helix angle) that engage gradually, delivering smoother, quieter, higher-load transmission than spur gears—ideal for high-speed drives.

### Features:

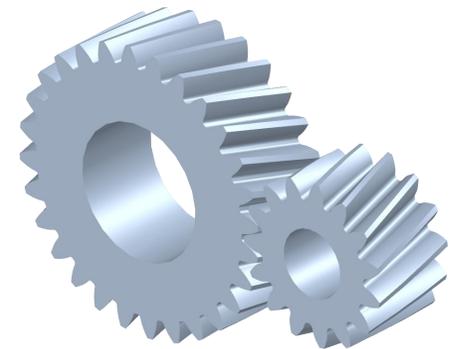
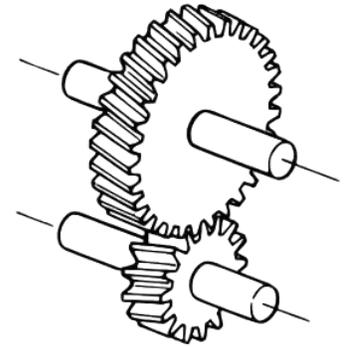
- Smooth Transmission: The contact area gradually changes during helical gear meshing, reducing impact and vibration, and lowering noise.
- High Load Capacity: Due to the simultaneous meshing of multiple teeth, it can withstand greater loads than spur gears.
- Suitable for parallel shafts and crossed shafts (e.g., parallel shaft drives, 90° crossed shaft drives).

- Axial Force: The helix angle generates axial thrust, which needs to be offset by thrust bearings or paired helical gears (e.g., herringbone gears).

- Higher Manufacturing Cost: Manufacturing is more complex than spur gears, requiring specialized machine tools (e.g., gear hobbing machines).

### Applications:

- Common transmission devices, automobiles, and speed reducers.



### 3. Straight Bevel Gear

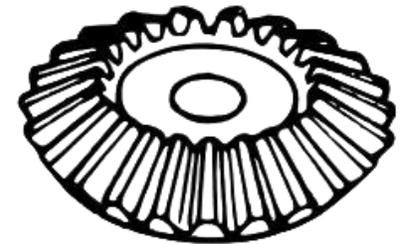
A gear is a type of gear with straight tooth lines arranged on a conical surface, used for power transmission between intersecting shafts (usually at 90°). Its tooth profile is distributed along the generatrix of the cone, and it makes straight-line contact during meshing.

#### Features:

- Simple structure: The tooth profile is straight, making machining and inspection relatively easy.
- No axial force, suitable for light to medium load transmission.
- Poor transmission smoothness: Single tooth contact during meshing results in higher noise and vibration compared to spiral bevel gears.
- Limited load capacity: Not suitable for extreme heavy loads or high-speed applications.

#### Applications:

- Work machines, printers, and similar equipment, particularly those designed for differential devices (differential units).



## 4. Spiral bevel gear

A bevel gear transfers power between intersecting shafts (often 90°). Its curved teeth provide gradual multi-tooth contact for smoother, higher-load transmission.

### Features:

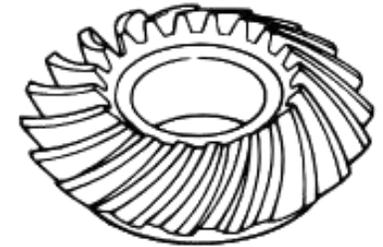
- **Smooth Transmission:** The simultaneous meshing of multiple helical teeth significantly reduces impact and noise (more than 50% noise reduction compared to straight bevel gears).
- **High Load Capacity:** Large tooth surface contact area, suitable for heavy-duty, high-speed applications (such as automotive differentials).
- **High Efficiency:** Transmission efficiency can reach over 98% (up to 99% after precision grinding).

- **Complex Manufacturing:** Requires specialized machine tools (such as Gleason or Olecon machine tools), resulting in high costs.

- **Axial Force:** The helix angle generates axial thrust, requiring the use of angular contact bearings.

### Applications:

- It is suitable for high-load and high-speed transmission applications, commonly used as the final speed reduction device in vehicles such as cars and trucks, as well as in ships.



## 5. Worm Gear Set

It is a transmission device consisting of a worm and a worm wheel, used for power transmission between intersecting shafts (usually  $90^\circ$ ), and has a very large reduction ratio and self-locking characteristics.

### Features:

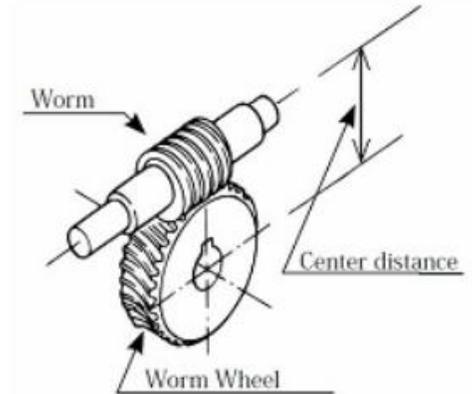
- High reduction ratio: Single-stage transmission ratios can reach 5~100 (or even higher), with a compact structure.
- Self-locking: When the worm lead angle is  $\leq$  the friction angle, the transmission is irreversible (prevents reverse drive, suitable for lifting mechanisms).
- Smooth operation: Multi-tooth progressive meshing results in extremely low noise (<60dB).

- Lower efficiency: Primarily based on sliding friction, efficiency is typically only 40%~90% (lubrication is required to reduce wear).

- High heat generation: Prone to overheating under high loads, requiring forced cooling or special lubricants.

### Applications:

- Used as a self-locking reducer to prevent backdriving in machinery, indexing devices, chain blocks, and portable generators.



## 6. Sprocket

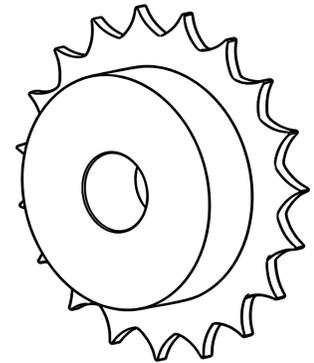
A circular transmission component resembling a gear, with teeth evenly distributed along its outer edge. The tooth profile is specifically designed to mesh with a chain, and it is used to transmit power and motion via chain drive.

### Features:

- They are mostly circular in shape, with evenly distributed teeth on the outer edge.
- Common tooth profiles include straight teeth and curved teeth, to improve meshing stability with the chain.
- Suitable for chain drive systems, allowing for easy adjustment of the transmission ratio by replacing the sprockets; meshing is primarily based on chain link engagement (different from gear meshing logic).

### Applications:

- Chain drive systems for bicycles and motorcycles
- Automotive timing chain drive systems
- Industrial conveyor lines and elevators (such as chain elevators/conveyors)
- Chain drive applications in agricultural machinery, etc.



## 7. Internal gear

An annular gear having teeth on the inner surface of its rim. The internal gear always meshes with the external gear.

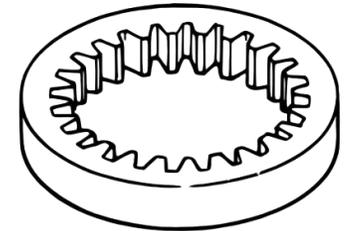
### Features:

- In the meshing of two external gears, rotation goes in the opposite direction. In the meshing of an internal gear with an external gear the rotation goes in the same direction.
- Care should be taken to the number of teeth when meshing a large (internal) gear with a small (external) gear, since three types of interference can occur.

- Usually internal gear is driven by external (small) gear.
- Allows compact design of the machine.

### Applications:

- Planetary gear drive of high reduction ratios, clutches etc.



# THANK YOU

Wenlio Gear specializes in precision bevel gears manufacturing for high-performance power transmission.

Our gear guides help engineers and sourcing professionals better understand gear design, selection, and applications.

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- 👉 Custom Manufacturing
- 👉 Fast Quotation

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