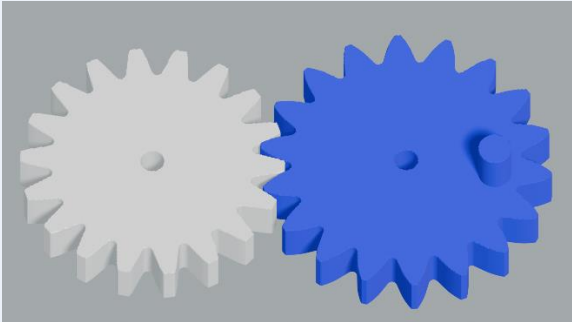


Display
model

INVOLUTE GEAR EFFECT OF PROFILE SHIFT

Gear Description

An involute gear is a toothed wheel whose tooth profile is the involute curve traced out by a point on a taut string as it unwinds from a base circle. The main advantage of this involute profile is that the point of contact of meshing gears then also moves along a straight line, hence ensuring constant velocity ratio and smooth transmission. Profile shifting in gear manufacturing involves modifying the gear tooth profile by moving the generating tool (rack or hob) towards or away from the gear's pitch circle. This process results in two types of shifts: positive and negative. A two-shift tooth profile involute gear features both positive and negative shifts, applied either to a reference tooth or across different sections of the gear. Gears transmit torque and motion through differently shaped teeth, ensuring uniform and continuous velocity. This design minimizes friction and wear. Profile shifts optimize load distribution and meshing during design. Reliable operation of involute gears depends on proper design, accurate manufacturing, and timely maintenance.



Parameters	Mathematical expression
Module	$m = \frac{z}{D}$
Pressure angle	$\alpha = \arccos(\frac{d_b}{d} \cdot \cos(\alpha_0))$
Pitch Diameter	$d = zm$
Addendum Coefficient	$h_a^* = 1 \times m$
Dedendum coefficient	$h_f^* = 1.25 \times m$
Profile shift coefficient	$x = (1 - z) \frac{\sin^2(\alpha_0)}{2}$

The 3D printed involute gear with a shift of its profile is a representative example of the Addictive Manufacturing capabilities in providing highly precise, functional, and application-tailored parts. This example highlights advancements in manufacturing technology, showcasing how optimizing tooth geometry enhances gear performance. Profile shifting improves load distribution and strength, demonstrating the revolutionary impact of modern techniques on mechanical engineering.