Working in AutoCAD

THE QUESTION

How does one draw and mesh involute gear teeth in AutoCAD?

Expert response provided by Jamie Pears, head of project management for Romax Technology Ltd.

Involute gears are the most commonly used types of gears and are those in which the gear tooth profiles are **involutes** of a circle.

When two involute gear teeth mesh, they always have a single point of contact and, as the gears rotate, the point of contact moves along a straight line. This straight line is tangent to the **base diameters** of the two gears. Additionally, the direction of the force generated between the contacting teeth is in the direction of this straight line, which is known as the **line of action** of the gear pair.

An involute profile is most commonly illustrated by the unwrapping of a string from a solid cylinder — the path that the end of the string traces is the **involute profile**, and the diameter of the cylinder is the **gear base diameter.** Using simple trigonometry, the generated curve can be calculated to be defined with a parametric equation, with the x and y coordinates being a function of a common parameter.

There are many videos on the internet that illustrate this process; simply Google "AutoCAD involute gears.")

While the reader's question is quite a basic one, it highlights an issue that designers have when creating accurate CAD models of 3-D meshing gears — especially bevel and hypoid gear sets.

The ability to automatically create 3-D models of gear sets from the analysis tools used to design them is therefore of great benefit and Romax Software tools are one example of where this is possible. In a matter of minutes, detailed models of meshing gears can be exported from a Romax analysis model and then easily be incorporated into a 3-D CAD model, therefore saving designers many hours of modelling. It is this line of thinking that also led Romax to create a new whole gearbox design tool aimed specifically at powertrain architects and designers. Launched last year, *Concept* not only allows designers to quickly design, rate and optimize gears, but also entire gearbox concepts, before being able to seamlessly share data with CAD systems.

Dr. Jamie Pears is the head of product management at Romax Technology. He holds MSc and Ph.D. degrees in physics from Nottingham University, U.K. Pears joined Romax Technology in 2000 as a software developer working on the *RomaxDESIGNER* analysis code developing the *RomaxNVH* software. Since then he has been involved in engineering projects as the NVH Team Leader, providing consultancy for many worldwide customers. Pears is now back, beginning with development as R&D manager, and currently as software team manager. For more information, please visit *www. romaxtech.com*.