[9] Elliptical gear design system

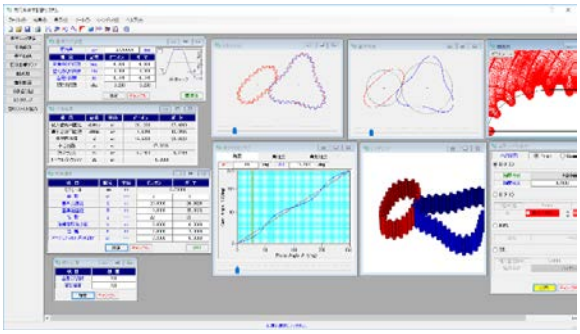


Fig. 9.1 Elliptical gear design system

9.1 Abstract

Non-circular gears have less slippage than cams, and can be designed more compactly than link mechanisms. In addition, it has extremely advantageous features such as the ability to reliably transmit loads. Elliptical gear design system can design not only the same leaf count but also different leaf count as shown in the drawing example. The design screen is shown in Figure 9.1.

9.2 Gear specification

The basic rack is shown in Fig. 9.1, and the gear specification input screen is shown in Fig. 9.2. In the example, the number of leaves of the pinion is 2 and the number of leaves of the gear is 3, but the number of leaves can be set in the range of 1 to 10.

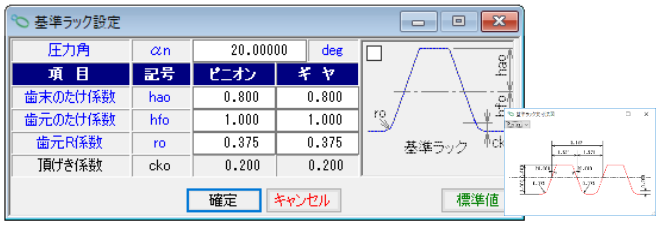


Fig. 9.2 Basic rack

Fig. 9.3 Gear specification input

9.3 Gear size

Figure 9.3 shows the dimensional results of the elliptical gear.

Fig. 9.4 Elliptical gear dimensions

9.4 Reference pitch line of elliptical gear

Figure 9.5 shows the reference pitch line of elliptical gear

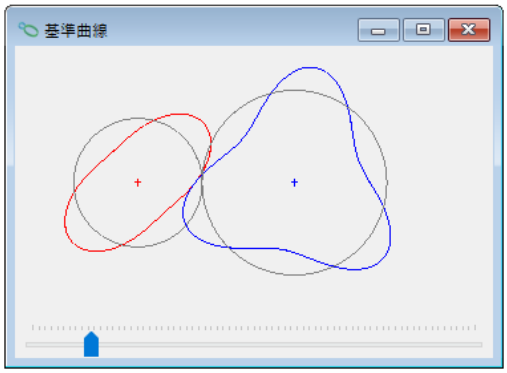
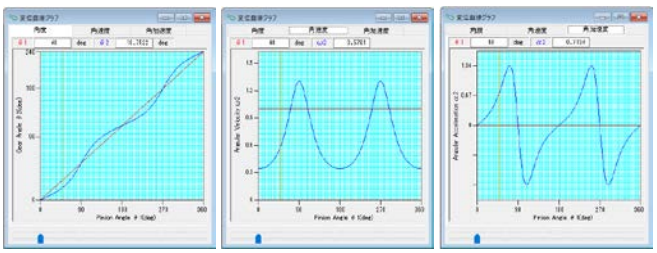


Fig.9.5 Reference pitch line of elliptical gear

9.5 Displacement curve graph

The angular displacement and angular velocity displacement and angular acceleration displacement graphs are shown in Figure 9.6. The angle cursors of this graph and the tooth profile diagrams in Figure 9.5 and Figure 9.9 are linked with the pinion rotation angle.



(a) Angular (b) Ang. velocity (c) Ang. acceleration

Fig. 9.6 Displacement curve

9.6 Generating of tooth profile

Figures 9.7 and 9.8 show the tooth profile creation.

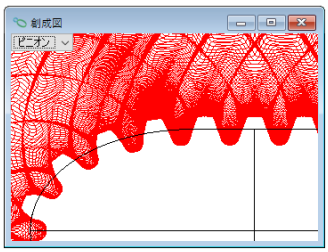


Fig. 9.7 Tooth profile (P)

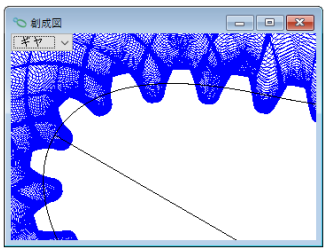


Fig. 9.8 Tooth profile (G)

9.7 Tooth profile

Fig. 9.9 shows the tooth profile.

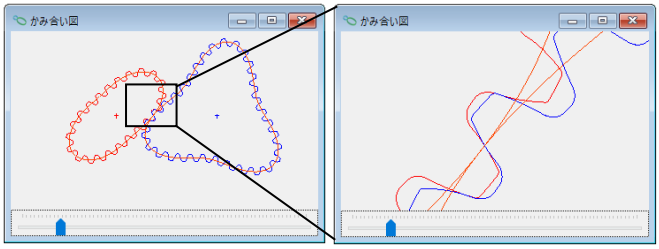


Fig. 9.9 Tooth profile

9.8 Teeth rendering

The tooth profile rendering of an elliptical gear is shown in Figure 9.10. You can change the viewpoint and rotation angle by the control form.

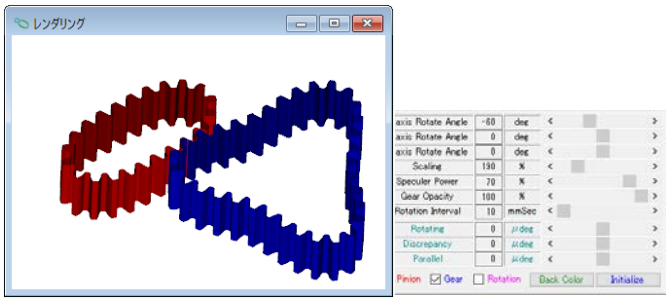


Fig. 9.10 Teeth rendering

9.9 Tooth file output

Tooth profiles of elliptical gears can be output as CAD files (DXF, 3D-IGES). An example of file output is shown in Figure 9.11.

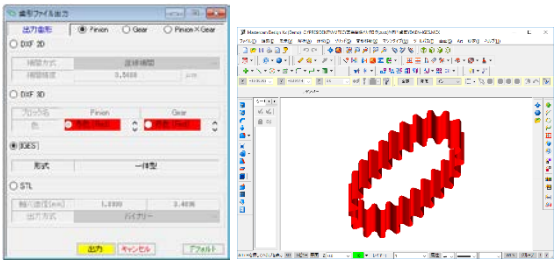
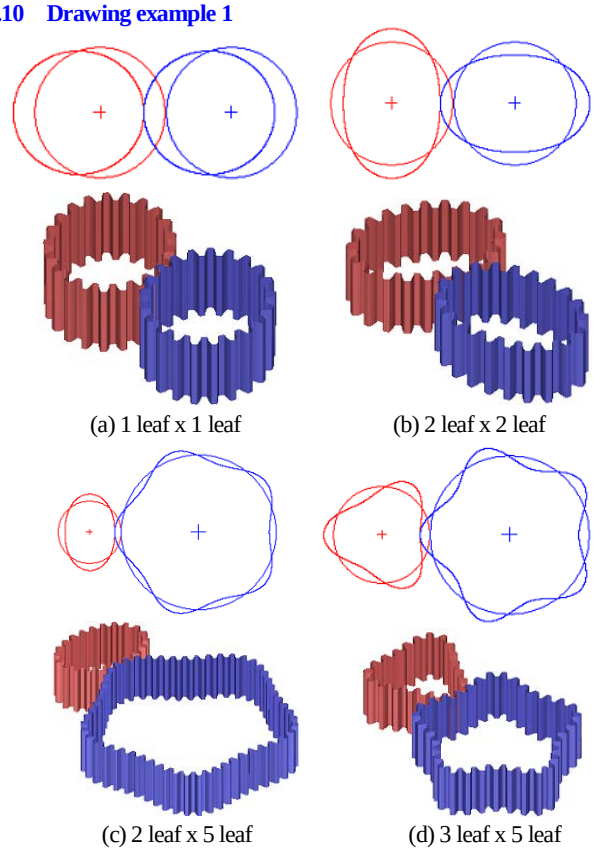


Fig. 9.11 File output and CAD drawing example

9.10 Drawing example 1



(a) 1 leaf x 1 leaf (b) 2 leaf x 2 leaf

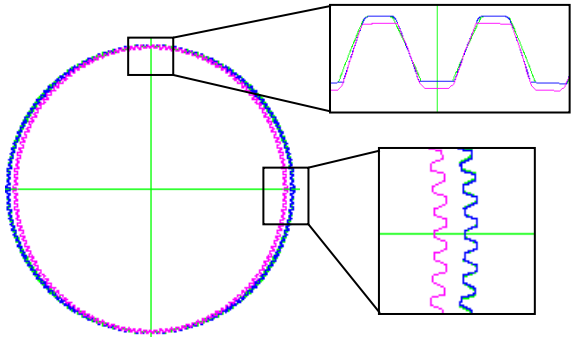
(c) 2 leaf x 5 leaf (d) 3 leaf x 5 leaf

Fig.9.12 Drawing example

9.10 Drawing example 2

An example of a wave gear designed using elliptical gear software is shown in Figure 9.13.

For wave gear software, see Fig.9.14.



Epi_z_1=164, Internal_z_2=160, Internal_z_3=164

Fig.9.13 Drawing example of wave gear

9.11 Strain wave gearing design system

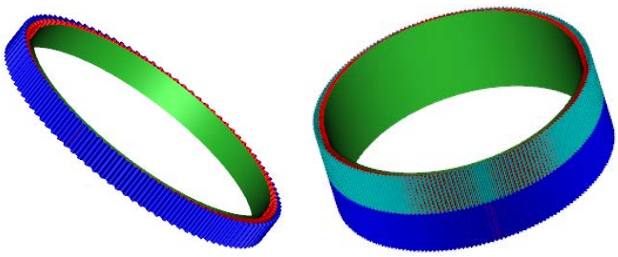


Fig.9.14 [47] Strain wave gearing design system