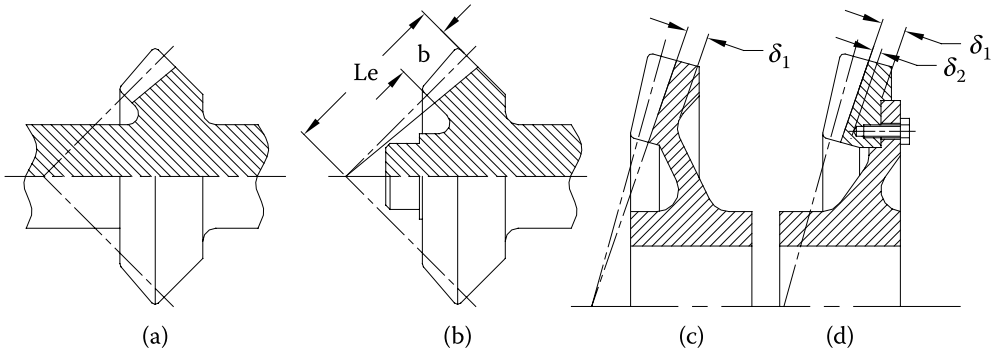

FIGURE 8.25 Bevel gears.

8.6 DESIGN OF TEETH

Part of the information related to the teeth has already been discussed in Chapter 7, Section 7.5 (for tooth root shape, see Figure 7.13) and Section 7.7 (for tooth profile modification, see Figure 7.20). There is not much to add.

The tip thickness of a tooth, S_t (Figure 8.26a) depends a little on the number of teeth (see Chapter 7, Figure 7.2), but it is very much influenced by the displacement, X, of the generating profile (Chapter 7, Figure 7.12). Therefore, when designing gears with considerable X value, close attention should be given to the thickness of the tooth tip. If the gears (without surface hardening) wear in service, it is recommended that $S_t \geq 0.5m$, because the service life of this gear may be limited by the wear until the tooth tip becomes sharp. If a gear doesn't have considerable wear, S_t of $\geq 0.25m$ is admissible. To prevent chipping (shown in Chapter 7, Figure 7.9d), case-hardened or nitrided teeth should have S_t of $\geq 2\delta_h + (0.08 - 0.1)m$, where δ_h is the case thickness after finishing. If the tooth tip is too thin, the case thickness here can be decreased by masking the top land of the teeth during the carburizing process.

The sharp edges of the tooth tip should be rounded by radius $r_1 \approx 0.1m$. That operation can be done while cutting the teeth, if the hob profile has a corresponding curvature. This rounding prevents a sharp stress concentration on the edge and may be very helpful to prevent scoring. However, finish-grinding the tooth flanks may partly or completely remove these radii. They should be restored and, when needed, polished.

The ends of a tooth should be rounded off or chamfered to make the maximal bending force more distant from its end. One of the possible options of chamfering is shown in Figure 8.26b.

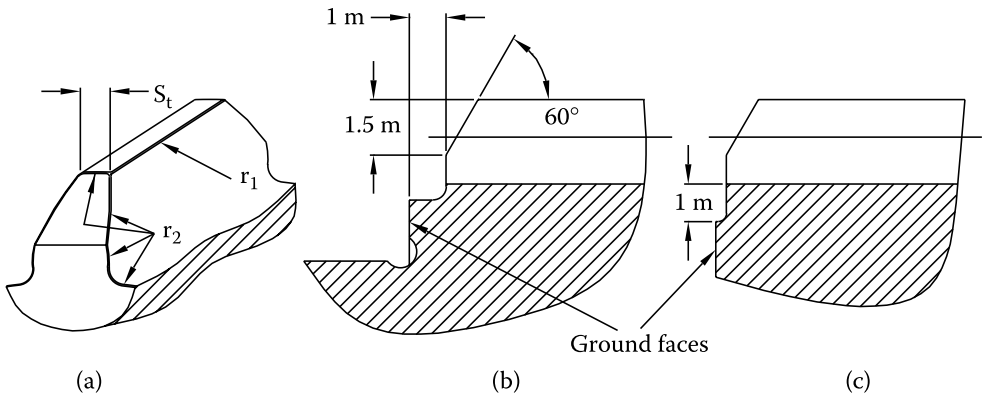

FIGURE 8.26 Tooth design.