

Design of Grinding Plates for a Universal Grinding Machine

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Abstract—New designs of cover plates and grinding plates for a universal grinding machine are developed. These designs greatly expand the functional capabilities of the machine. The plates are durable and their operating costs are low.

Keywords: grinding, universal grinding machine, grinding plates, cover plates, deltoid plates, round plates, square plates

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Designers are seeking means of expanding the capabilities of the grinding system in [1]. In particular, it is expedient to create grinding plates of different shapes: deltoid and square (90 × 90 mm) plates without chip exit holes; and round plates (diameter 125 mm) with chip exit holes [2].

Each type of grinding plate is optimal for particular operating conditions (Fig. 1, Table 1).

Deltoid plates are optimal for grinding in locations with limited accessibility and also for grinding with considerable force, since the dynamic forces transmitted to the spindle of the grinding machine are the least in this case.

Square plates may be used to grind along linear joints. They are also expedient in the honing of cutting tools (chisels and blades) and may be used in special equipment for honing the cutting edges of more complex tools [3–5].

Round plates may be used for large areas. They are optimal in grinding open wooden surfaces of large extent.

Round abrasive sheets (diameter 125 mm) for eccentric machines and rectangular sheets (90 × 200 mm) for plane grinding machines are commercially available. Therefore, the plate dimensions are determined by the standard dimensions of such abrasive sheet. Table 1 itemizes the types of grinding plates and their functions.

Channel attachment in grinding ensures considerable rigidity. That permits additional improvement of the design to reduce the dynamic loads on the spindle of the grinding machine. In particular, material may be removed from the grinding plates.

Such measures must not compromise the rigidity of the grinding plate in operational conditions. In deltoid plates, material is removed from the center or the edges but retained in the attachment zone. In other plates, the external dimensions are such that material must be removed from several points; strengthening ribs are left at the boundary of such areas.

The decrease in mass by this means is greatest for round plates: up to 30% of the mass. For deltoid plates, 10% of the mass is removed. Table 2 summarizes the results.

The design of round and square cover plates is different than the design of deltoid plates. To ensure sta-

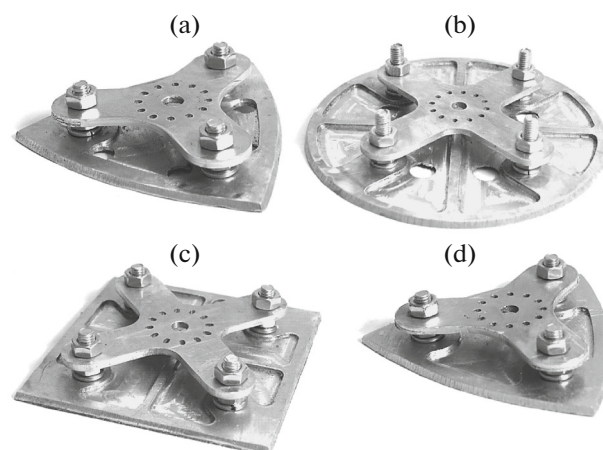


Fig. 1. New grinding-plate designs: (a) deltoid plate with chip exit holes; (b) round plate with chip exit holes; (c) square plate without chip exit holes; (d) deltoid plate without chip exit holes.