Practical experience with the mass production of thin flat blanks from powder composites of various compositions in the SPPD-6 two-stand rolling mill \[1, 2\] has revealed a number of operating singularities in the mode of rolling involved, consisting in continuous rolling of high-porosity strip in the first stand of the mill and local densification of blanks in this strip in the second stand. These singularities are due in the first place to instability of the speed of exit of the strip from the rolls of the first stand and of the speed of gripping of the strip by the rolls of the second stand.

The speed of exit of the strip from the rolls of the first stand is influenced by forward slip, which depends on the nature and properties of the powder and on the strip thickness and density. The speed of gripping of the strip by the rolls of the second stand is determined not only by the frequency of revolution of the rolls but also by the gripping angle, which is controlled by the strip thickness and roll barrel diameter, as well as by lagging of the material being worked in the rolls, which depends on its degree of densification and other factors. Clearly, in order to be able to synchronize the speeds of exit and entry of strip in a continuous rolling process, it is necessary to have a device for the stepless regulation of the frequency of revolution of the rolls in one of the stands.

In the SPPD-6 mill, having a constant frequency of roll revolution in both stands, the drive kinematics is such that the speed of strip entry into the rolls of the second stand is always greater than the speed of strip exit from the rolls of the first stand. The negligible ductility of unsintered strip results in its periodic rupture, which produces a certain amount of scrap. The small distance between the rolls of the first and second working stands hinders control of the semifinished strip.

Loose powder slipping through between the rolls of the first working stand in the SPPD-6 mill falls between the rolls of the second stand and is pressed into a part. This disturbs the stability of the process, and again parts have to be scrapped when their weight and density exceed their permissible limits.

The second stand of the SPPD-6 mill has a comparatively small roll barrel diameter (150 mm), which restricts, because of extension beyond tolerance limits, to 25 mm the blank length in the direction of rolling. The design of the forming roll with pressed-in inserts necessitates making a separate roll for each type and size of parts. For parts of complex configuration such as flat spirals or stars, technical difficulties have been experienced in the manufacture of rolls with pressed-in inserts. Such parts have been produced in the SPP-4 mill \[3\] by rolling semifinished strip between plain rolls fitted with forming elements.

With the SPPD-6 mill, another difficulty arising during rolling is powder accumulation in the check and screw-down mechanism openings in its beds. According to technical specifications for rolled materials, this powder must be regularly removed from these openings and various recesses, for which it is necessary to stop the mill, with loss of output.

The process has been found to have its limitations also in the production of high-porosity blanks from some composite powders. At relative blank densities of less than 0.5-0.6 the density of surface layers is frequently much higher than that of central zones, which leads to lamination of blanks.

To meet a growing demand for thin flat blanks of complex configuration up to 60 mm in size, a new two-stand reversing mill, the SPPD-10, has been designed and constructed (Fig. 1). In the designing of the mill previous experience with the operation of the SPP-4 and SPPD-6 mills was taken into account. The technical specification of the SPPD-10 mill is as follows:
The screw-down mechanism in both stands is of the eccentric type, the direction of rolling is at an angle of 35° to the horizontal, and a 4A100-4UZ motor (GOST 19523-74) is used.

The drive of the rolls in both mill stands (Fig. 2) is from a common motor 9 and a distributing shaft 7 connected to it by a V-belt transmitter 8. The kinematic circuit of the roll drive in the first working stand consists of a V-belt gear transmitter 6, a VTslA2-131-03 variable-speed drive 4 (GOST 10819-75), a reduction worm gear 5, and a gear-box 2 connected to the rolls by spindles 1. The circuit of the roll drive in the second stand comprises a V-belt gear transmitter 10, a reduction worm gear 3, and a gear-box 11 connected by spindles 12 to the rolls in the second working stand.

The mill constitutes a group of independent functional units - drives and stands - connected to one another by spindles (Fig. 3). The drive units are mounted on a frame type bed 3 consisting of a welded bottom, supports, and a plate, which are joined together by bolts. The electric motor 6 with a belt tensioning mechanism rests on bed supports. Brackets 7 with the bearings of the distributing shaft 8 and a tensioning mechanism 2 of the V-belt transmitter of the roll drive in the second working stand are situated on the welded bottom. The variable-speed drive 5, reduction gear 4, and gear-box 10 of the roll drive in the first working stand are located on the plate. They are connected together by covered couplings 9. The reduction gear 1 and the gear-box 12 of the roll drive in the second working stand are attached to the lower surface of the bed plate. The reduction gear is linked to the gear-box by a rear