

HORIZONTAL CONTINUOUS CASTING OF HIGH-STRENGTH
ALUMINIUM-BRONZE AND OTHER COPPER-BASE ALLOYS(*)

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From the literature it is known that already a whole range of copper-base alloys are being cast in horizontal continuous casting plants. It can be seen that continuous casting plants with moulds lying horizontally have several basic economic advantages when compared to their vertical counterparts. In particular compared with vertical continuous casting plants their cost of purchase, installation, and running as well as the floor area taken up are much less. On the other hand different solidifying conditions arise basically because of the horizontal arrangement of the mould.

At present the plant in the non-ferrous metal foundry of Sulzer Brothers Ltd consists essentially of an oil fired clay bonded graphite crucible that serves to keep the melt hot. The melt flows out of the heated crucible into the graphite horizontal mould that is surrounded by a water cooler. A graphite mandrel can be inserted for the production of tubes and other hollow sections. The billet emerging from the mould is pulled over a series of transport rollers in stages by hydraulic drawgear. The length and speed of traverse as well as the time between the individual draws are adjustable.

The results of investigations into the horizontal continuous casting of hollow billets from various copper alloys are available. Continuous-cast billets of INXCYDA 53, a complex aluminium-bronze exhibit a very favourable structure on account of the cooling

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conditions arising in the casting mould. The mechanical properties attained are superior to those of a sand casting of the same composition. While the strength and yield point increase, the elongation and notch impact strength of the continuous casting are more even. Above all in contrast to extruded aluminium-bronze the mechanical properties of continuously cast aluminium-bronze are independent of the direction of sampling due to the absence of a deformation texture. Investigation on hollow billets of CuSn 14, CuSn 10, CuSn 5 ZnPb and CuPb 15 Sn shows that the mechanical properties recorded in the literature for vertical continuous casting are attained. The macrostructure clearly shows that the horizontal continuous casting process produces asymmetrical solidification. On the one hand the underside of the billet is more finely grained, while relative to the geometric centre the thermal centre is displaced upwards. But what matters to the user most is that in practical terms this non-uniformity in the macrostructure does not influence the mechanical properties even in the largest hollow billets produced to date, with an outer diameter of 210 mm and an inner diameter of 153 mm. The results set out indicate conditions and possibilities for casting alloys mentioned with acceptable quality by the horizontal continuous casting process.

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