TECHNICAL DATA SHEET

CHAMFERING OF COMMUTATOR BAR EDGES

MACHINING OF RING HELICAL GROOVES

01 - COMMUTATORS

Commutator interbars need close attention as they can cause serious problems for the brushes in terms of contact disturbance. Particular attention needs to be paid to correct undercutting and bevelling of each and every bar.

After truing the commutator, the edges of the bars should be chamfered.

This operation is necessary when the voltage between bars is high (see TDS-01).
The chamfering increases the distance between the upper edges of two successive bars: the risk of arcing is therefore reduced.
In addition the bar chamfering eliminates the risks of slivers of flush micas due to incorrect undercutting (Fig. 1 and 2).

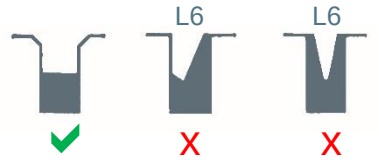

Figure 1 - L6 Flush micas

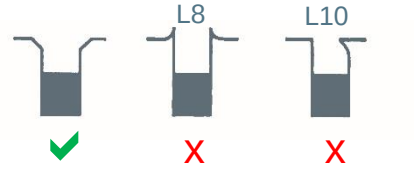

Figure 2 - Slivers
L8 Burrs at bar edges
L10 Copper dragging

The chamfer angle is usually 45°, sometimes 30°, and chamfer depth is, according to the cases, from ℓ /20 to ℓ /10, where ℓ is the bar width (Fig. 3).

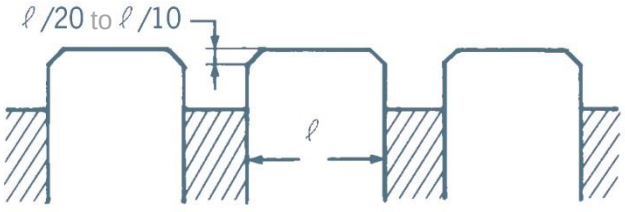

Figure 5 - Definition of commutator bar chamfers

Note: The commutators which equip motors of low power industrial machines (less than 1 kW) are not chamfered by the constructors who make sure to use rectifying equipment and tools which ensure no high mica or burrs. Copper chips and burrs can be eliminated by the use of a hard brush.

Figure 3 - High mica (L6)

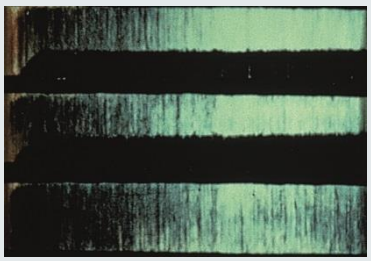

Figure 4 - Dark fringe on commutator, due to high mica

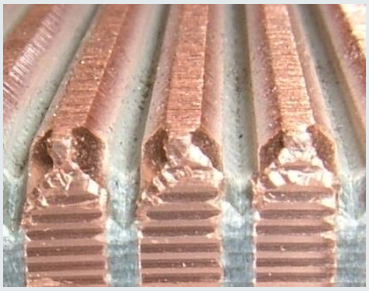

Figure 6 - Bad chamfering Chamfers reduce the bar width to less than 50% of its initial value

02 - SLIP RINGS

Because of its advantages with the brush current distribution, ventilating action, dissipation of losses, mechanical stability, helical grooving of rings is being carried out on an increasing scale by constructors especially for machines operating at a peripheral speed above 20 m/s.

Helical grooving entails the machining of a helical groove in the slip rings. The 'a' dimension of the brush needs to be an **exact multiple of the helical grove pitch 'h'.**

$$a = k \times h$$ where k is an integer and h the helical pitch

This ensures constant surface area under the brush and hence constant brush pressure and current density, especially in the case of synchronous machines (high density current).

After machining of grooves, it is absolutely essential to remove any sharp edges injurious to the brushes by a 45° chamfer (Fig. 8).

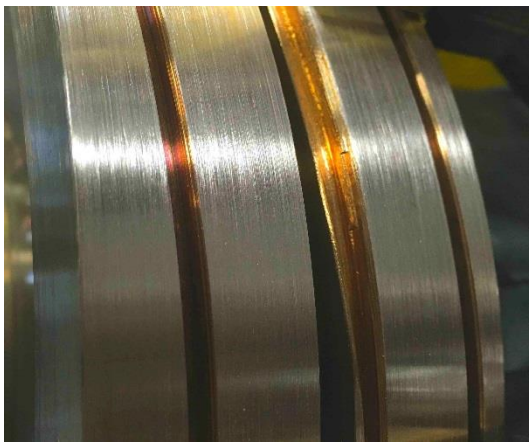

Figure 7 - Grooved slip ring

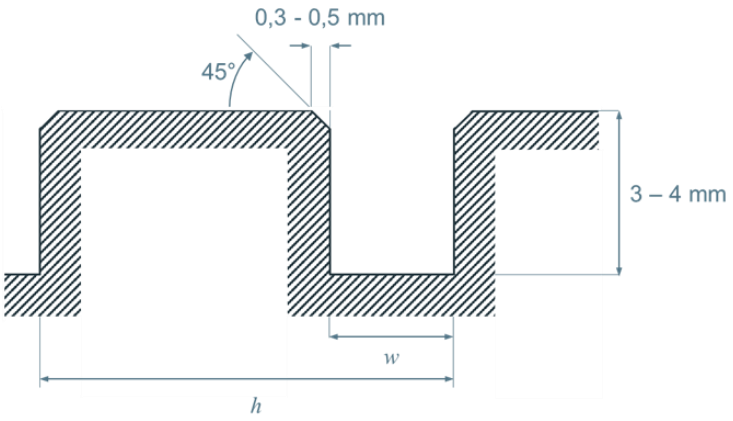

Figure 8 - Chamfering slip ring grooves

In addition, it is advantageous to smooth the possible deformation of the slip ring surface caused by the machining of the chamfer with a medium stone.

In the example illustrated in figure 8, which represents the general case, the chamfer width is from 0.3 to 0.5 mm.

The chamfering must be renewed as soon as the wear of the ring reaches the chamfer base.

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