On RAISING BRUSH PRESSURE

The presence of certain circumstances, giving rise to unstable contact between brush and commutator, may require a decision to increase pressure applied on the brush by the brush holder pressure system.

Such a case presents itself when the machine vibrates, or when it receives shocks transmitted to it by the driven mass, the framework or the coupling, that is to say, when the mechanical disturbances arise from **outside** the machine: traction, rolling mill and grinding mill rotors, etc. Thus, on stationary machines, a pressure of 25 kPa instead of 17,5 kPa is often used, whereas for traction, pressures from 30 to 45 kPa are frequently used.

Also, when brush vibration is caused by a moderate out of round of the commutator on a machine running at a slow or average speed, experience shows that the resultant imperfect contact and consequent sparking at the brushes can be eliminated by an increase of pressure without noticeably increasing the losses and, consequently, the temperature of the commutator.

But, if the commutator is rotating at a high speed (more than 35 metres/second) the same out of round of the commutator subjects the brush to high acceleration, when an increase of pressure will have no effect. To minimise this problem a shock absorber should be fitted to the brush or brush holder but the best action is to remove the cause by re-surfacing the commutator.

Briefly, it can be stated that an increase of pressure ΔP on a brush is advisible when:

$$P.S < M \gamma < (P + \Delta P) S$$

where P is the initial pressure, $P + \Delta P$ the increased pressure, M mass of the brush, S the brush section and γ the acceleration (measured with an accelerometer) applied to the brush.

The increase ΔP will be ineffective when:

$$M \gamma > (P + \Delta P) S.$$

REMARKS

1 - But, if the vibration originates **under the contact surfaces** of the brushes, that is to say, if it is a result of excessive and abnormal friction of the brushes on the commutator, an increase of pressure on the brush is not only useless, but even harmful; it develops an increase in losses, and, consequently, an increase in commutator temperature which, in turn, causes further elevation of the friction and the brush and brush holder can be seriously damaged.

To sum up, it is no use hoping to eliminate the vibration of ''friction'' by an increase of pressure on the brushes.

2 - It is to be noted that when the pressure is increase the contact drop is lowered and consequently the commutating ability of the brush.

An appreciable increase in pressure can only be applied on easy DC machines, i.e. without particular commutating difficulties.

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