

installations, using alternating-current motors directly connected to machine tools are now in operation, and the maintenance account is extremely low.

The use of the alternating current motor is peculiarly adapted to planers, slotters, shapers, or tools of a similar nature, in which reciprocating motion is employed, provided variable cutting speed is not an object. It is obvious that on the quick reverse with machines of this character, unless the motor is abnormally large, or a fly wheel be employed, there is imposed a considerable momentary overload upon the motor. These overloads will be more readily taken care of by the alternating current motor than by the direct current motor, for the reason that overloads on direct current motors, if severe, will, if the overload capacity of the motor is not adequate, be accompanied by flashing at the brushes.

The alternating current motor, involving as it does, no commutator, which must be more or less accessible for cleaning and inspection, permits of a greater mechanical protection of the windings than is possible in the case of the direct current motor.

For group driving, the alternating current is specially desirable. For individual drive, where the conditions are of a definite character, and where the quality of the material operated upon and the tool steel are not liable to change, the alternating current motor furnishes an ideal drive so far as simplicity of construction and general reliability are concerned. In the case of the alternating current motor, speed changes must be made by means of some variable speed device other than the motor, as the motor itself is essentially a constant speed machine. Hence, it is peculiarly adapted to grinding operations and for the operation of certain classes of wood-working machinery, or tools situated in places that are not free from moisture, acid fumes or inflammable materials. It may be placed in the hands of unskilled operators and requires no skill or attention worth mentioning, and will bear overloading and abuse almost beyond belief—but the greatest advantage of the alternating current system is that it can be transformed either in voltage or phase and adapted for long distance transmission. The alternating current motors may be used in connection with direct current motors. Both alternating current and direct current systems have become quite common for industrial and railroad plants. In these installations, the main generators are of the polyphase alternating current type, direct current being obtained by means of rotary converters or motor generator sets.

So one might go on discussing the manifold advantages of the application of electrical energy in our industries. It is only necessary to assemble in one's mind the factors that have made possible