

1.6 Typical load torque characteristics:

One of the essential requirements in the selection of a particular type of motor for driving a machine is the matching of speed-torque characteristics of the given drive unit and that of the motor. Therefore the knowledge of how the load torque varies with speed of the driven machine is necessary. Different types of loads exhibit different speed torque characteristics. However, most of the industrial loads can be classified into the following four categories.

- ✓ Constant torque type load
- ✓ Torque proportional to speed (Generator Type load)
- ✓ Torque proportional to square of the speed (Fan type load)
- ✓ Torque inversely proportional to speed (Constant power type load)

Constant Torque characteristics:

Most of the working machines that have mechanical nature of work like shaping, cutting, grinding or shearing, require constant torque irrespective of speed. Similarly cranes during the hoisting and conveyors handling constant weight of material per unit time also exhibit this type of Characteristics.

Torque Proportional to speed:

Separately excited dc generators connected to a constant resistance load, eddy current brakes have speed torque characteristics given by

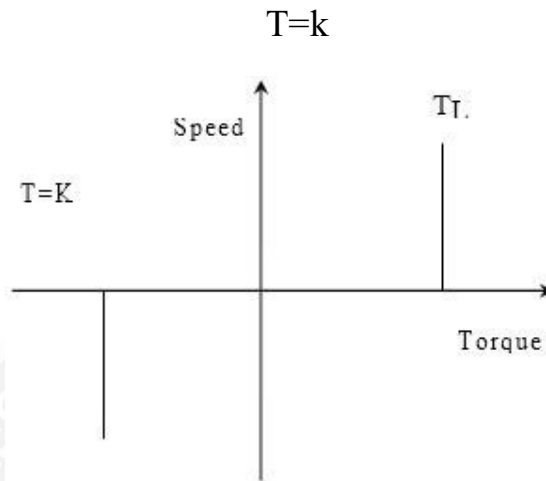


Figure 1.6.1 Torque Proportional to speed

(Source: "Fundamentals of Electrical Drives" by G.K.Dubey, page-19)

Torque proportional to square of the speed:

Another type of load met in practice is the one in which load torque is proportional to the square of the speed.

Examples:

- ✓ Fans rotary pumps,
- ✓ Compressors
- ✓ Ship propellers

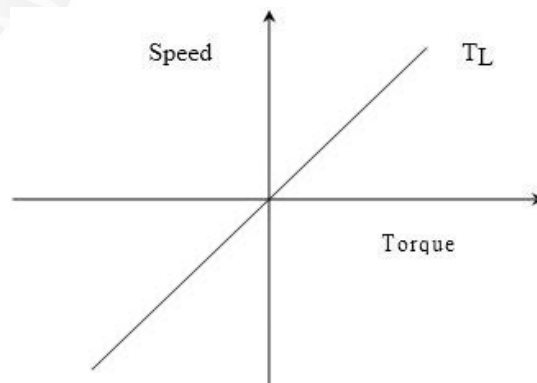


Figure 1.6.2 Torque Proportional to square of the speed

(Source: "Fundamentals of Electrical Drives" by G.K.Dubey, page-20)

Torque Inversely proportional to speed:

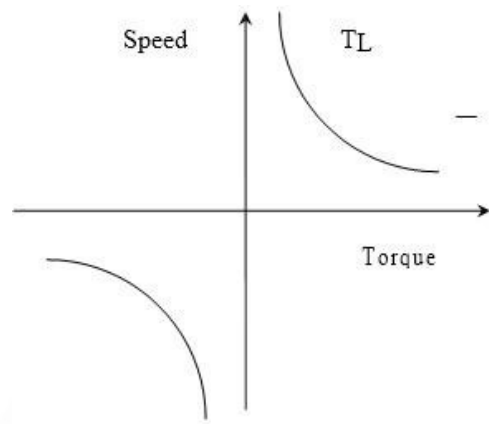


Figure 1.6.3 Torque Inversely proportional to speed

(Source: "Fundamentals of Electrical Drives" by G.K.Dubey, page-20)

Certain types of lathes, boring machines, milling machines, steel mill and electric traction load exhibit hyperbolic speed-torque characteristics.