Subject : Electrical Drives & Traction
Topic : Classes of Motor Duty

Classes of Motor Duty in Electrical Drives:

IS: 4722-1968 categorizes various load time variations encountered in practice into eight standard Classes of Motor Duty in Electrical Drives:

1. **Continuous duty.**
2. **Short time duty.**
3. **Intermittent periodic duty.**
4. **Intermittent periodic duty with starting.**
5. **Intermittent periodic duty with starting and braking.**
6. **Continuous duty with intermittent periodic loading.**
7. **Continuous duty with starting and braking.**
8. **Continuous duty with periodic speed changes.**

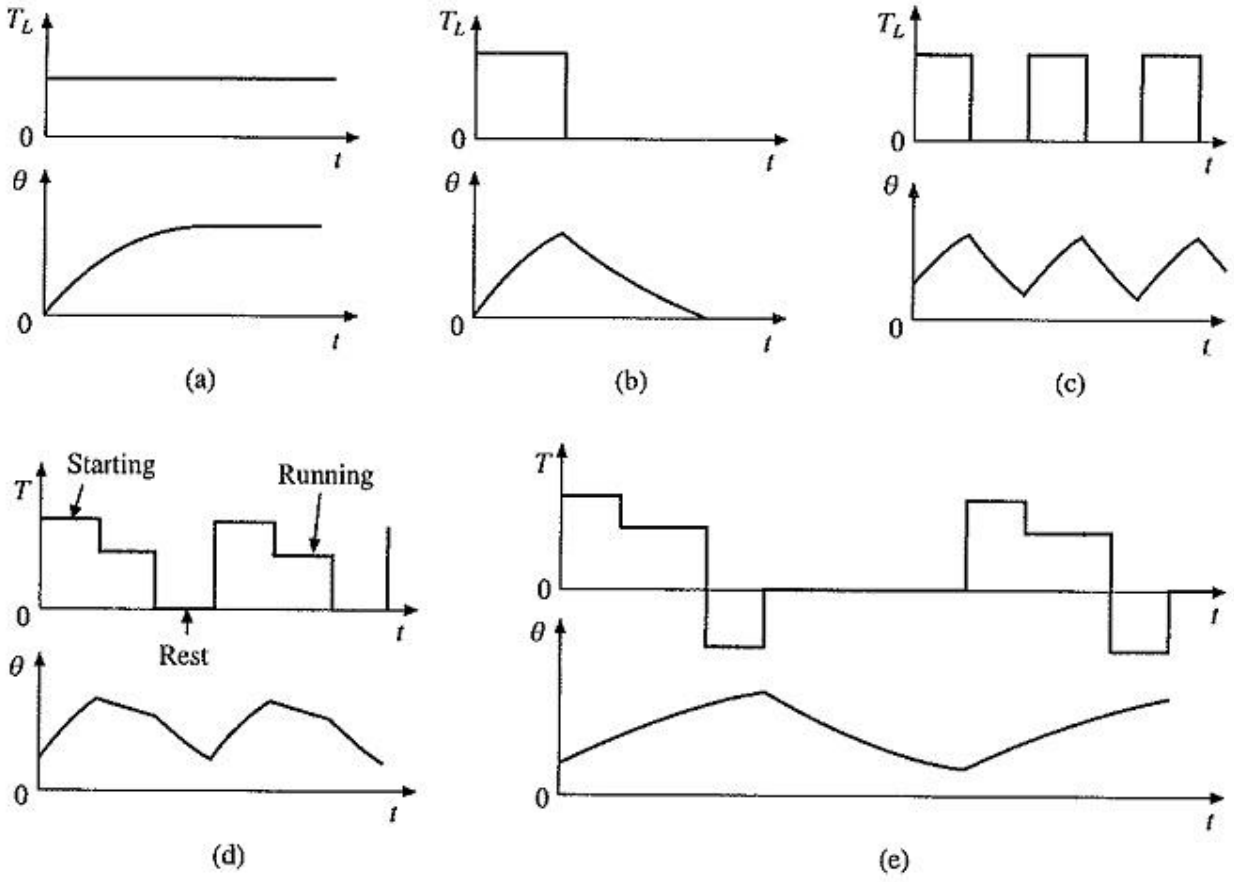

Fig. 4.2 Some classes of motor duty.

These Classes of Motor Duty in Electrical Drives are explained below.

1. Continuous Duty (Fig. 4.2(a)):

It denotes the motor operation at a constant load torque for duration long enough for the motor temperature to reach steady-state value. This duty is characterized by a constant motor loss. Paper mill drives, compressors, conveyers, centrifugal pumps and fans are some examples of Classes of Motor Duty in Electrical Drives.

2. Short Time Duty (Fig. 4.2(b)):

In this, time of drive operation is considerably less than the heating time constant and machine is allowed to cool off to ambient temperature before the motor is required to operate again. In this operation, the machine can be overloaded until temperature at the end of loading time reaches the permissible limit. Some examples are: crane drives, drives for household appliances, turning bridges, sluice-gate drives, valve drives, and many machine tool drives for position control.

3. Intermittent Periodic Duty (Fig. 4.2(c)):

It consists of periodic duty cycles, each consisting of a period of running at a constant load and a rest period. Neither the duration of running period is sufficient to raise the temperature to a steady-state value, nor the rest period is long enough for the machine to cool off to ambient temperature. In this Classes of Motor Duty in Electrical Drives, heating of machine during starting and braking operations is negligible. Some examples are pressing, cutting and drilling machine drives.

4. Intermittent Period Duty with Starting (Fig. 4.2(d)):

This is intermittent periodic duty where heat losses during starting cannot be ignored. Thus, it consists of a period of starting, a period of operation at a constant load and a rest period; with operating and rest periods, being too short for the respective steady-state temperatures to be attained.

In this duty, heating of machine during braking is considered to be negligible, because mechanical brakes are used for stopping or motor is allowed to stop due to its own friction. Few examples are metal cutting and drilling tool drives, drives for fork lift trucks, mine hoist etc.

5. Intermittent Periodic duty with Starting and Braking (Fig. 4.2(e)):

This is the intermittent periodic duty where heat losses during starting and braking cannot be ignored. Thus, it consists of a period of starting, a period of operation with a constant load, a braking period with electrical braking and a rest period; with operating and rest periods being too short for the respective steady state temperatures to be attained.

Billet mill drive, manipulator drive, ingot buggy drive, schrewdown mechanism of blooming mill, several machine tool drives, drives for electric suburban trains and mine hoist are some examples of this duty.

6. Continuous Duty with Intermittent Periodic Loading:

It consists of periodic duty cycles, each consisting of a period of running at a constant load and a period of running at no load, with normal voltage across the excitation winding. Again the load period and no load period being too short for the respective temperatures to be attained. This Classes of Motor Duty in Electrical Drives is distinguished from the **intermittent periodic duty** by the fact that a period of running at a constant load is followed by a period of running at no load instead of rest. Pressing, cutting, shearing and drilling machine drives are the examples.

7. Continuous Duty with Starting and Braking:

Consists of periodic duty cycle, each having a period of starting, a period of running at a constant load and a period of electrical braking; there is no period of rest. The main drive of a blooming mill is an example.

8. Continuous Duty with Periodic Speed Changes:

Consists of periodic duty cycle, each having a period of running at one load and speed, and another period of running at different speed and load; again both operating periods are too short for respective steady-state temperatures to be attained. Further there is no period of rest.