



Page Title: **DEFINITION OF DUTY, OR DUTY CYCLE**

Midwest Motion Products Inc, founded in 2001 and having shipped many tens of thousands of DC Motors and Gearmotors, has had extensive experience with applying Motion Control products for a wide variety of OEM applications. Many of these applications require only intermittent duty, and, subsequently, brushed motor technology is very often the solution of choice, due to the simplicity of operation, and inherent cost efficiency.

For the purposes of proper Motor or Gearmotor sizing and the optimal technology selection (brushed or brushless?) it is always prudent to consider the relative duty.

The definition of DUTY or DUTY CYCLE, is as follows:

Duty, or Duty Cycle, is the proportion of time during which a component, device, or system is operated under load versus the time at rest. The duty cycle can be expressed as a ratio or a percentage. For instance, suppose a Motor operates under full load for 10 seconds, then is shut off for 50 seconds, then is run for 10 seconds again, and so on. The Motor runs for ten out of 60 seconds, or 1/6 of the time, and its duty cycle is therefore 10/60, or 17 percent. The more a Motor, Gearmotor or component is used, the greater the heat will be generated, thereby resulting in accelerated wearing of key components. Therefore, the higher the duty cycle, the shorter the useful life, all other things being equal. Please see Page two of this document for a complete listing of the Duty Classification Codes, as defined by the "International Electro-Technical Commission" for Electric Motors.

The [On-Line Solution Finder](#) found on MMP's website must assume that all applications are 'continuous duty' in nature. If the duty is less than continuous, it is very often possible to decrease the size, and subsequent cost, of a Motor or Gearmotor Solution. If your application is less than 100% duty, it may be economically beneficial to contact our Sales Office to discuss this information in greater detail.

Thank you for your consideration of the information above.

Please be invited to contact our Sales Office for further discussion and analysis.

Contact: sales@midwestmotion.com or call 320-490-7060

Please also refer to the information found at [THIS LINK](#) for further details.



U.S.A. Company
Since 2001

MIDWEST MOTION PRODUCTS

DESIGN, MANUFACTURING & DISTRIBUTION - MOTION CONTROL EQUIPMENT

www.midwestmotion.com email: sales@midwestmotion.com

MIDWEST MOTION PRODUCTS

IEC (the International Electro-Technical Commission) uses eight duty cycle designations to describe electrical motor operating conditions:

S1	Continuous duty	The motor works at a constant load for enough time to reach temperature equilibrium.
S2	Short-time duty	The motor works at a constant load, but not long enough to reach temperature equilibrium. The rest periods are long enough for the motor to reach ambient temperature.
S3	Intermittent periodic duty	Sequential, identical run and rest cycles with constant load. Temperature equilibrium is never reached. Starting current has little effect on temperature rise.
S4	Intermittent periodic duty with starting	Sequential, identical start, run and rest cycles with constant load. Temperature equilibrium is not reached, but starting current affects temperature rise.
S5	Intermittent periodic duty with electric braking	Sequential, identical cycles of starting, running at constant load and running with no load. No rest periods.
S6	Continuous operation with intermittent load	Sequential, identical cycles of running with constant load and running with no load. No rest periods.
S7	Continuous operation with electric braking	Sequential identical cycles of starting, running at constant load and electric braking. No rest periods.
S8	Continuous operation with periodic changes in load and speed	Sequential, identical duty cycles run at constant load and given speed, then run at other constant loads and speeds. No rest periods.

Note: Because the thermal time constant of a DC Brushed motor is typically around 20 minutes, it can also be advisable to consider any cycle of 20 minutes or greater to be continuous.