ACCELERATED ENDURANCE TESTING:

CAN IT SKEW YOUR ACCEPTANCE TEST RESULTS?

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.

It has been our experience at MMP, that equipment which is properly sized for an "Intermittent Duty" application is not always **tested *intermittently.*** In other words, in order to accelerate the process of qualification/endurance testing, our Customers have been known to test 'continuously' (or at an accelerated rate of duty) which is not, of course, an accurate measure, since continuous/accelerated rates of use can and does create a different set of operational parameters, not the least of which is heat generation, during these accelerated tests. At the same time, we understand that it's often very difficult to conduct tests in "real time" under the intermittent conditions – for instance, if the application requirements dictate that a given product will last for, say, ten years, and the actual usage is 2000 cycles per year, with a two minute cycle, that's only 67 Hours of use per year. So, in order that the endurance testing can be completed within one month, instead of ten years, the desired concept might be that the units are run continuously, for 670 Hours, under full load. The problem, however, is that the conditions change with continuous operation – with the higher continuous/accelerated current draw, the unit will reach its peak running temperature much sooner than it would under actual application conditions. Added heat can alter the winding resistance, and could cause increased brush wear, commutator wear, armature overheating and/or premature motor failure. Failure modes can include shorted, burned or open windings, bearing wear, and even de-magnetization, in extreme cases. Humidity and high altitude can also influence wear rates. The ingress of moisture into the motor can cause existing brush dust to become a conductive "paste" and cause rapid brush wear and/or premature failure.

While limiting or preferably eliminating the ingress of moisture into a motor is always recommended, certain applications may benefit from the use of custom brushes. Please consult our sales office for more details on custom brush selection.

Following is a chart which defines the Insulation System Classifications for motors, in accordance with NEMA Standards:

Temperature Tolerance Class	Maximum Operation Temperature Allowed		Allowable Temperature Rise - at full load (1.0 service factor)	Allowable Temperature Rise (1.15 service factor)
	°C	°F	°C	°C
A	105	221	60	70
B	130	266	80	90
F	155	311	105	115
H	180	356	125	-

All of MMP's motors meet or exceed the "Class F" insulation system requirements.
This means that the unit will operate at the rated current, and subsequent rated temperature (155°C) on a continuous basis, without overheating (thermal runaway).

All of MMP's motor and gearmotor spec sheets list continuous and peak torque/current values. These values are provided as guidelines to help the user PRE-determine the suitability of a product prior to actual testing, but are not intended to establish any final conclusions, prior to actual testing and measurement of empirical data.

Naturally, it is fully acceptable to exceed the rated current, and subsequently the rated torque of a motor on an intermittent basis – sometimes as many as 5X-6X the rated continuous values. However, there are a great many variables which enter into reaching conclusions regarding acceptable frequency and duration of these overload conditions, which is why we at MMP always ask that you contact us directly to discuss your application and endurance testing plans in detail, so we can be assured of your ultimate success in employing our Products, long term.

One method that can be employed is to try starting the testing, using the 'actual' intermittent cycles.
Then, accelerate the frequency and/or duration of the test cycles and monitor the motor case temperature.
If a motor case temperature should begin to rise, consider backing down on the test cycle frequency and/or duration, as allowed.

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

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