Callan Technology Ltd is a design and manufacturing company for a wide range of industrial DC servomotors, tachogenerators and components. Callan Technology's industrial motor platform (M4 range) is a family of rare earth permanent magnet DC servomotors:

M4-200X (0.4 – 1.6 Nm),
M4-295X (2.0 – 8.1 Nm)
M4-420X (10.4 – 30 Nm)

All motors are available in a variety of shafts & mounts, connection types, tachogenerator or incremental encoder feedback, parking brake and a variety of other special features.

C4-16X (0.2 - 0.4 Nm) is a family of compact, rare earth servomotors specifically designed for applications where low cost is important while maintaining ruggedness and performance.

The use of rare earth magnets results in compact motors with superior thermal stability and power/weight ratio compared to conventional ferrite motors.

Callan Technology also manufactures three frame sizes of precision frameless tachogenerators

TGF 1568 (2 pole, KG 3.0 – 14 V/krpm)
TGF 1810 (4 pole, KG 7.0 – 32 V/krpm)
TGF 2030 (4 pole, KG 3.0 – 57 V/krpm)

Callan Technology has been short listed for the final of the 12th Annual Irish National Enterprise Awards. Eight companies from all over Ireland will compete for the top award.

The event, organised by the County and City Enterprise Boards of Ireland takes place on November 10th at Dublin castle. It acknowledges outstanding achievement by small businesses throughout Ireland.

For further details see : www.enterpriseboards.ie
www.youtube.com/watch?v=QCGzzI9PBMM

IF YOU WANT TO CONTINUE TO RECEIVE A COPY OF CALLAN TECHNOLOGY NEWS, PLEASE SEND AN EMAIL WITH "SUBSCRIBE" TO **INFO@CALLANTECHNOLOGY.COM**

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Engineered to Order - Case Study

C&F Wind Energy Ltd, Galway, Ireland, recently commissioned Callan Technology to design a three phase alternator for their new range of commercial wind turbines.

The novel generator is a rare earth magnet, axial flux machine. The product range provides 3 rating options 6kW, 10kW of 15kW at 240 rpm.

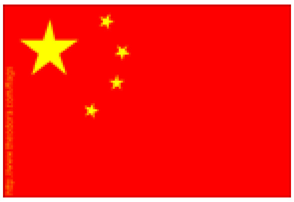
Production of the first commercial wind turbines at C&F Wind Energy is planned for end 2009.

For further details of Callan Technology “Engineered to Order” click here.

For further details of C&F Wind Energy see

www.cftooling.ie
www.cfwindenergy.ie

Callan Technology – Distributor Focus



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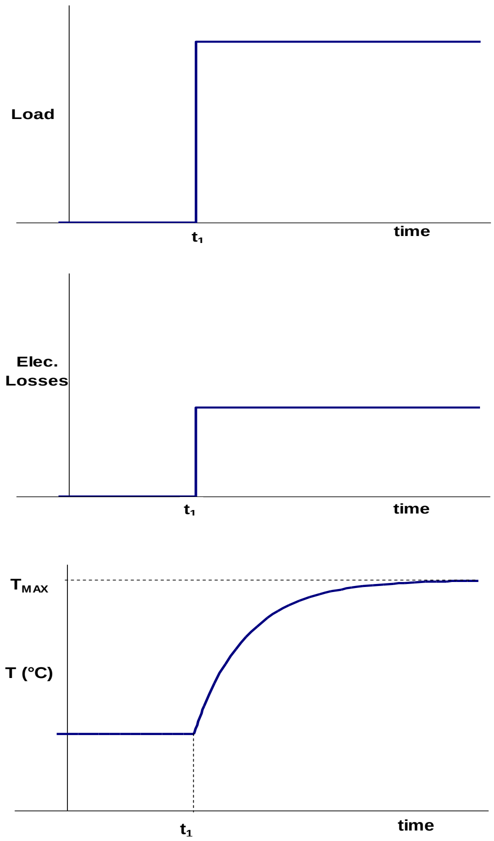
DC Servomotor Tutorial – Consideration of Duty Cycle

The ability of a servomotor to deliver torque is limited by the temperature rise of the windings. (Motor current results in power dissipation in the windings which raises the temperature of the entire motor). The Duty Cycle of an application therefore needs to be carefully considered when sizing a motor for an application. NEMA ICS16 (widely referenced in USA) identifies continuous duty and intermittent duty cycles. IEC 60034-1 (used in Europe) is somewhat more detailed and identifies 10 classes of duty cycle labelled S1, S2 … S10 resp. The first three of these are the most commonly encountered.

Duty Type S1 – Continuous Running Duty

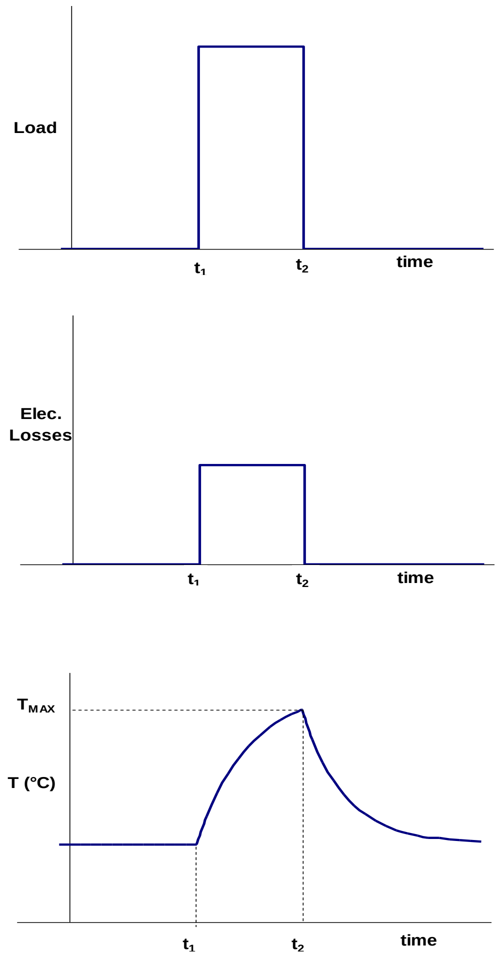
S1 duty refers to operation at a constant load maintained for sufficient time to allow the machine to reach thermal equilibrium.



It is essential that the motor rated torque exceeds the value of load torque in order to prevent burn-out. S1 duty is used in determining the rating of an industrial servomotor. However typical servomotor duty is rarely of type S1.

Duty Type S2 – Short Time Duty

S2 duty involves operation at a constant load for a given time, (less than that required to reach thermal equilibrium) followed by a time at rest and de-energised, of sufficient duration to re-establish machine temperature within typically 2°C of the coolant or local environment.

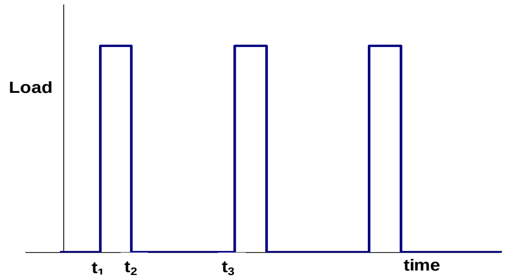


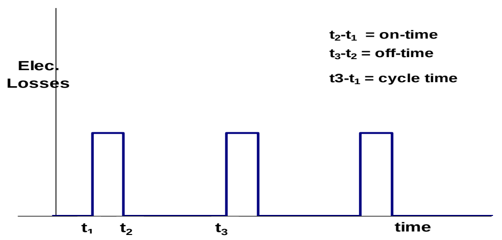
Since the “on” time is too short for the motor to reach a steady thermal condition, the load during the “on” time is permitted to exceed the continuous rating of the motor. However care must be taken so that the maximum motor temperature is not exceeded.

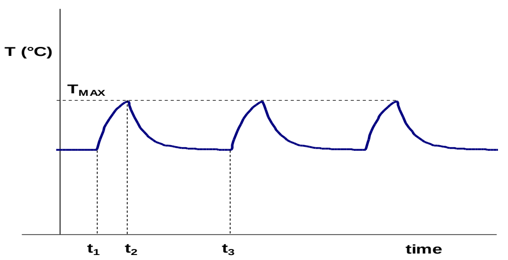
Duty Type S3 – Intermittent Periodic Duty

S3 duty consists of a sequence of identical duty cycles, each consisting of a time of operation at constant load (on time) and a time de-energised and at rest (off time). The cycle time (periodic time) is less than the thermal time constant so that thermal equilibrium is not reached during the time on load. The appropriate abbreviation is S3 followed by the cycle duration factor

Example : S3 25%



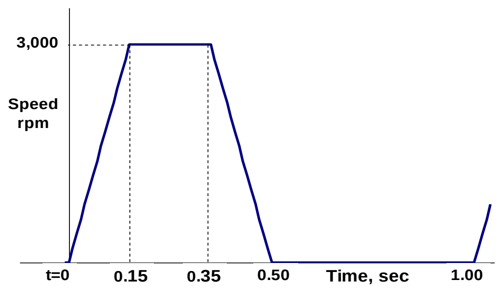




Typical Application Sizing

A typical servomotor application load cycle defines the acceleration rate, run time/speed, deceleration rate and idle time of the desired load.

An example is shown for an application whereby the worst case duty cycle requires an inertial load (Inertia, JL = 0.8kgcm2 ,friction TFL=0.1 Nm) to be accelerated from 0 to 3,000 rpm in 150 msec, runtime at 3,000 rpm for 200 msec, deceleration to zero speed in 150 msec followed by an idle time of 500 msec before the entire cycle commences again.



Using a C4-161D servomotor at 24V DC with parameters:

Motor Inertia, JM = 0.49 $kgcm^2$
Rated Cont. Torque, Tc = 0.21Nm
Motor Friction, TFM= 0.017 Nm
Viscous Damping, = 0.003 Nm/krpm

it can be deduced that required torque is

Tacc = (JL+JM) x α +TFL + TFM
Trun = TFL + TFM + F1 xN
Tdec = -(JL+JM) x α + TFL + TFM

where α = acceleration rate, N = speed

Tacc= (0.49+0.8)x10-4x2094+0.1+.017=0.39 Nm
Trun= 0.1+.017 + 0.009 =0.126 Nm
Tdec= -0.000129 x2094+0.1+.017 = -0.153 Nm

These values of torque and speed are within the capability of the C4-161D motor operating from a 24V supply. The periodic time of the duty cycle is significantly less than the motor thermal time constant. Therefore the winding temperature will stabilize at a value equivalent to the temperature rise of a load equivalent to the RMS value of the duty cycle. Finally the RMS value of the duty cycle must be checked to ensure that the resultant RMS torque and speed fall within the safe operating area (continuous duty zone) of the motor’s toque-speed profile.

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The RMS torque and speed of the application load cycle can be evaluated by the following formulae:

$$T_{RMS} = \left[\frac{T_1^2 t_1 + T_2^2 t_2 + \ldots + T_n^2 t_n}{t_1 + t_2 + \ldots + t_n} \right]^{1/2} \quad \text{(Nm)}$$

$$N_{RMS} = \left[\frac{N_1^2 t_1 + N_2^2 t_2 + \ldots + N_n^2 t_n}{t_1 + t_2 + \ldots + t_n} \right]^{1/2} \quad \text{(rpm)}$$

For this example, the RMS torque is 0.17 Nm and the RMS speed is 1573 rpm. This operating point is safely within the continuous capability of the C4-161D motor so the application will not overheat the windings.

AfterMarket Focus

Motor: **M4-2004-01A-537**

Originally used on: Robomatix Ltd.
Body Diameter: 75 mm
Length: 186 mm
Shaft:- Ø12g6
Thermostat
MS connectors
Tachogenerator:- 7.0 V/krpm

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