This document captures ideas, experiences, and informal recommendations from the Yaskawa Partner Support team. It is meant to augment – not supersede manuals or documentation from motoman.com. Please contact the Partner Support team at partnersupport@motoman.com for updates or clarification.

Use Motosize to Configure a Linear Track

Introduction:

Linear Tracks have many design parameters, one being the size of the motor. MotoSize can validate which Yaskawa motor best works for the design provided.

Data Types Needed

There 12 fields of data needed to evaluate the necessary motor. Many can be found in the gear box catalog and others will derive from the project parameters.

Below is a breakdown of each data type, the required units, and a description of what it is and where to find it.

Data Type Definitions

Data Type	Units	Notes
Linear Load Weight	Kg	Weight of everything sitting on the track
Linear Speed	Mm/sec	Speed of the Linear Track
Pinion Diameter	Mm	Can be found in gear box selection catalog from the Track Manufacturer
Gear Ratio	n:1	Can be found in gear box selection catalog from the Track Manufacturer
Coefficient of Friction	n/a	Provided by the Track Manufacturer
Mechanical Efficiency	n/a	Can be found in gear box selection catalog (sometimes use .89)
Accel / Decel Time	Sec	Time it takes the carriage to accelerate and decelerate
Cycle Stopped Time	Sec	How long is the trolley on track not moving during cycle
Cycle Stroke Length	Mm	How long is the track
Pinion Inertia	Kg*m^2	Can be found in gear box selection catalog from the Track Manufacturer
Gear Box Input Inertia	Kg*m^2	Can be found in gear box selection catalog from the Track Manufacturer
Additional Motor Inertia	Kg*m^2	Can be found in gear box selection catalog from the Track Manufacturer

Selecting the Best Motor

With the data fields filled in, it is simply a matter of selecting a motor from the drop-down menu and selecting the "Evaluate Track" button.

Sample Results

Linear Track Evaluation

Input Parameters

Linear Load Weight	1000	(kgf)	Cycle Stopped Time	75	(sec)	
Linear Speed	300	(mm/sec)	Cycle Stroke Length	3000	(mm)	
Pinion Diameter	26	(mm)	Pinion Inertia	.00252	(kg*m2)	
Gear Ratio	9	(n:1)	Gear Box Input Inertia	.001566	(kg*m2)	
Coefficient of Friction	.006		Additional Motor Inertia	0	(kg*m2)	
Mechanical Efficiency	.89		Motor Type	SGM7G-20APK-YR11 ⌄		
Accel / Decel Time	.7	(sec)				

Results

Evaluation: PASSED!

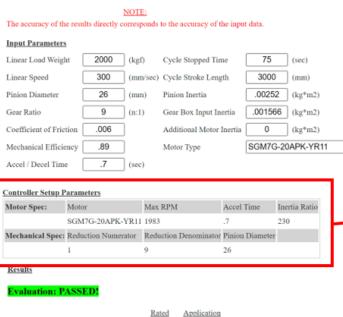|		Rated	Application
Motor Speed	(rpm)	4700	1983
Running Load Torque	(N*m)	11.5	0.1
Starting Torque	(N*m)	23	1.9
RMS/Rated Motor Torque	(%)	80	2.1
Load/Motor Inertia Ratio		5	1.5
Cycle RMS Torque	(N*m)	11.5	0.2
Pinion Speed	(rpm)	--	220
Reflected Load Inertia	(kg*m2)	--	0.00368
Constant Speed Time	(sec)	--	9.3
Cycle Motion Time	(sec)	--	10.7
Total Cycle Time	(sec)	--	85.7

A motor that passes will be green.

Borderline will be Yellow.

Overloaded will be Red.

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Viewing the Report

NOTE:
The accuracy of the results directly corresponds to the accuracy of the input data.

Input Parameters

Linear Load Weight	2000	(kgf)	Cycle Stopped Time	75	(sec)
Linear Speed	300	(mm/sec)	Cycle Stroke Length	3000	(mm)
Pinion Diameter	26	(mm)	Pinion Inertia	.00252	(kg*m2)
Gear Ratio	9	(n:1)	Gear Box Input Inertia	.001566	(kg*m2)
Coefficient of Friction	.006		Additional Motor Inertia	0	(kg*m2)
Mechanical Efficiency	.89		Motor Type	SGM7G-20APK-YR11	
Accel / Decel Time	.7	(sec)			

Controller Setup Parameters

Motor Spec:	Motor	Max RPM	Accel Time	Inertia Ratio
	SGM7G-20APK-YR11	1983	.7	230
Mechanical Spec:	Reduction Numerator	Reduction Denominator	Pinion Diameter	
	1	9	26	

The report summarizes the input data and results, but also list out the Parameters needed to enter in the robot controller.

The results can be printed to a PDF for archival purposes.

Results

Evaluation: PASSED!

		Rated	Application
Motor Speed	(rpm)	4700	1983
Running Load Torque	(N*m)	11.5	0.2
Starting Torque	(N*m)		2.6
RMS/Rated Motor Torque	(%)	80	2.8
Load/Motor Inertia Ratio		5	2.3
Cycle RMS Torque	(N*m)	11.5	0.3
Pinion Speed	(rpm)	--	220
Reflected Load Inertia	(kg*m2)	--	0.00577
Constant Speed Time	(sec)	--	9.3
Cycle Motion Time	(sec)	--	10.7