



To Our Valued Customers,

Since our founding in 1945, Bayside Motion Group has grown from a small gearing manufacturer to an international supplier of motion control products and engineered solutions. Today, Bayside has a world class portfolio of products and services that can provide you, our customer, with **A Solution For Every Axis!**

We believe that Bayside's success is directly attributed to our ability to listen and commit our engineering resources to your motion control needs. We have introduced over 200 innovative products and advancements to the marketplace backed by more than 50 patents for linear and rotary positioning stages, servomotors and drives and helical gearmotors. We take great pride in offering you a tradition of highly integrated systems with advanced servo motors, nano-class piezo devices and a variety of high precision sensors. It's all part of our *Tightly Coupled Integration* philosophy which we call **Embedded Design**. Unlike assemblies of unrelated drive components, a Bayside drive solution is pre-engineered, pre-tested and pre-packaged to ensure a consistent control architecture, common wiring schemes and a unitized aesthetic look for your machine. It also guarantees faster implementation and an expedited time to market. In the near future, our **Embedded Design** efforts will offer you an even higher level of integration with embedded electronics and wireless mode communication.

This catalog represents Bayside's years of engineering excellence and our full commitment to meet the needs and objectives of your motion control projects. We hope you find it easy to use and informative. On behalf of Bayside and all its employees, I would like to thank you for using Bayside's quality products and services. You have our commitment that we will continue to be the leading innovator in motion control and automation solutions designed to make your machines run **faster! better! and at a lower cost!**

Wishing you great success in your business.

Avi Telyas
CEO

A Solution For Every Axis

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Corporate
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▶ Linear & Rotary Positioning Stages



Linear & Rotary
Positioning Stages

150

▶ Servo Motors & Drives



Servo Motors
& Drives

198

▶ Gearmotors & Gearheads



Gearmotors
& Gearheads

BAYSIDE®

LUGE®

Linear & Rotary Positioning Stages



Linear Positioning Stages

- Direct drive linear or rotary motors for long travel and high speed
- Low-profile ball screw or lead screw driven stages with crossed roller bearings for short travel and high precision
- Ball screw, lead screw or linear motor driven stages with crossed roller bearings for short travel and ultra high precision



Rotary Stages

- Low-friction, zero backlash, high accuracy rotary motion with integrated brushless servo motor
- Precision worm-gear rotary table with high stiffness and load capacity



Z Wedge

- Direct drive ball screw driven stage with cross roller for precise vertical positioning



Crossed Roller Slides & Bearing Sets

- Low-friction linear slides
- Low-friction, high stiffness for long life operation



Nanopositioning

- Single or multi-axis piezo motor systems for resolutions below 50nm using high resolution linear encoders
- Brushless linear motor stage for smooth, high force, constant velocity applications



Multi-Axis Systems

- Superior integrated motion control systems for high-tech manufacturing

The Bayside Motion Group Full Line Catalog represents Bayside's 57 years of engineering and manufacturing excellence. Within these pages you will find Bayside's products organized under 3 brands:

Luge - Linear & Rotary Positioning Stages

i-Drive - Servo Motors & Drives

Stealth - Gearmotors & Gearheads

These brands represent the highest quality products available within the Motion Control industry. Bayside is proud to put its name on these quality products. You will be confident to have them on your machine!

iDRIVE[®]

STEALTH[®]

Servo Motors & Drives



Brushless Servo Motors

- Housed or frameless construction for servo or high speed application
- IP65 protection
- NEMA or metric frame sizes



Brushless Digital Drive / Control

- Easy to use software for programming and operation
- Resolver or encoder feedback
- Automatic shaft position detector
- Unique technology that allows for high power in a small package
- Configurable for torque, velocity and indexing mode

Gearmotors & Gearheads



Stealth[®] Servo Gearmotors

- Brushless servo motor integrated with a helical planetary gearhead
- Single piece construction rotor and sun gear for proper alignment and smooth operation
- IP65 protection
- NEMA or metric frame sizes




Stealth[®] Planetary Gearheads

- Helical planetary design
- In line and right angle
- Low backlash
- Unique motor mounting for error-free installation


Product Line Overview

Linear & Rotary Positioning Stages


Linear and Rotary Stages

Icon	Product Series	Feature	Width (mm)	Travel (mm)	Length (mm)	Max. Load (kg)	Actuation	Accuracy	Repeatability
	Luge LM	Long Travel Precision	100 to 250 (3 sizes)	200 to 1,400	565 to 1,765	650	Ball Screw	$\pm 60\mu\text{m}$ to $\pm 8\mu\text{m}$	$\pm 15\mu\text{m}$ to $\pm 5\mu\text{m}$
		Long Travel Precision	100 to 250 (3 sizes)	200 to 2,000	503 to 2,388	650	Linear Motor	$\pm 20\mu\text{m}$ to $\pm 3\mu\text{m}$	$\pm 15\mu\text{m}$ to $\pm 2\mu\text{m}$
	Mini-Luge	Precision Compact	50, 60	80 to 380	280 to 580	727	Ball Screw	$52\mu\text{m}$ to $65\mu\text{m}$	$+5.2\mu\text{m}$ to $+6.5\mu\text{m}$
	Micro	Low Profile High Precision	50 to 150 (4 sizes)	25 to 200	164 to 538	652	Ball or Lead Screw	$\pm 23\mu\text{m}$ to $\pm 8\mu\text{m}$	$\pm 10\mu\text{m}$ to $\pm 5\mu\text{m}$
	Ultra	Side Driven Open or Solid Frame Ultra High Precision	200 to 600 (4 sizes)	100 to 500	256 to 768	2,187	Ball Screw, Lead Screw, or Linear Motor	$\pm 10\mu\text{m}$ to $\pm 3\mu\text{m}$ $\pm 10\mu\text{m}$ to $\pm 1\mu\text{m}$	$\pm 5\mu\text{m}$ to $\pm 3\mu\text{m}$ $\pm 5\mu\text{m}$ to $\pm 0.5\mu\text{m}$
	Z Wedge	True Vertical Motion	100 to 200 (3 sizes)	10 to 25	210 to 265	20	Ball Screw	$\pm 7\mu\text{m}$ to $\pm 5\mu\text{m}$	$\pm 2\mu\text{m}$
	Nano - Positioning	Nano Step Positioning	50 to 150 (4 sizes)	15 to 160	55 to 200	544	Piezo Ceramic Linear Motor	$\pm 20\mu\text{m}$ to $\pm 1\mu\text{m}$	$\pm 10\mu\text{m}$ to $\pm 0.2\mu\text{m}$
	Rotary	Rotary Motion Ultra Precision	100 to 200 (3 sizes)	360°	130 to 230	250	Direct Drive	± 24 to ± 12 arc sec	± 8.2 to ± 4.1 arc sec
		Rotary Motion Precision	100 to 300 (4 sizes)	360°	143.5 to 410.7	460	Worm Gear	± 2 arc min	± 12 arc sec


Crossed Roller Linear Slides

Icon	Product Series	Feature (mm)	Width (mm)	Travel (kg)	Max. Load	Material
	SE	Extended Travel	50 to 150 (4 sizes)	25 to 400	980	Aluminum or Cast Iron
	SF	Flanged/Sealed	50 to 150 (4 sizes)	25 to 150	395	Aluminum or Cast Iron
	SP	Limited Travel	50 to 150 (4 sizes)	25 to 150	395	Aluminum or Cast Iron
	SC & SK	Crank & Knob Lead Screw	50 to 150 (4 sizes)	25 to 150	395	Aluminum or Cast Iron
	SW	Double "V" Low Profile	38 to 100 (3 sizes)	25 to 600	871	Aluminum only

Crossed Roller Bearing Sets


Icon	Product Series	Feature	Roller Diameter (mm)	Length (mm)	Maximum Load (kg)
	RC	Crossed Roller	1, 2, 3, and 6	20 to 700	2,180
	RW	Double "V" Crossed Roller	3 or 6	50 to 700	2,180

Multi-Axis System 3U Integrated Chassis


Icon	Product Series	Number of Axes	Controller	Amplifier Type	Power/Axis	Input Voltage
	3U	1 to 4	5 Brands	Linear & PWM	144 to 4,800 W	115 to 230 Vac

Servo Motors & Drives

Servo Motors


Icon	Product Series	Frame Size	Windings (Vdc)	Length (mm)	Continuous Torque T_c (Nm)	Maximum Speed (RPM)	Feedback
	Brushless	60 to 142 mm NEMA 23 to 42	160, 300 & 660	139 to 306	0.54 to 21.9	5,400	Encoder Resolver
	Two Wire	90 mm	48 to 300	182 to 220	1.86 to 2.97	4,600	Encoder
	Frameless	32 to 254 mm	12 to 600	20 to 100	0.044 to 58.0	30,000	N/A

Drives


Icon	Product Series	Power Output (kW)	Continuous Current (amps)	Input Command	Commutation	AC Input (Volts)	I/O
	i-Drive Servo Amplifier	0.25 to 1.5	2.2 to 6.7	$\pm 10V$	Sensorless or Hall Start-up	115 or 208/230 (1 phase) 203/230 (3 phase)	5 digital/1 analog inputs 1 digital output

Gearmotors & Gearheads

Gearmotors

Icon	Product Series	Configuration	Frame Sizes	Cont. Torque (Nm)	Ratios	Backlash (arc minutes)	Gear Teeth	IP Rating	Windings	Feedback
	GM	In-Line	60 to 115 mm NEMA 23 to 42	3 to 60	5, 7, 10 (3 ratios)	< 10	Helical Planetary	IP 65	160 Vdc 360 Vdc	Encoder Resolver
	DX Servo Wheel	In-Line	152 & 203 mm Wheel	26 to 48	20 to 36 (4 ratios)	N/A	Helical Planetary	N/A	24 Vdc 48 Vdc	Encoder

Gearheads

Icon	Product Series	Gear Teeth	Configuration	Frame Sizes	Cont. Torque (Nm)	Ratios	Backlash (arc minutes)	IP Rating
	PS	Helical Planetary	In-Line	40 to 300 mm (8 sizes)	5 to 4,181	3 to 100 (12 ratios)	< 3	IP 65
	PX	Helical Planetary	In-Line	60 to 115 mm NEMA 23 to 42 (3 sizes)	18 to 158	3 to 100 (11 ratios)	< 8	IP 65
	RS	Helical Planetary / Spiral Bevel	Right Angle	60 to 300 mm (7 sizes)	11 to 4,181	5 to 100 (9 ratios)	< 4	IP 65
	RX	Helical Planetary / Spur Bevel	Right Angle	60 to 115 mm NEMA 23 to 42 (3 sizes)	7 to 45	5 to 100 (9 ratios)	< 14	IP 65
	RT	Spiral Bevel / Helical	Right Angle Thru Bore	90 to 220 mm (5 sizes)	34 to 565	3 to 30 (5 ratios)	< 4	IP 65
	RD	Spiral Bevel / Helical	Right Angle Double Shaft	90 to 220 mm (5 sizes)	23 to 565	1 to 30 (7 ratios)	< 4	IP 65
	RB	Spiral Bevel	Right Angle	90 to 220 mm (5 sizes)	23 to 565	1 to 3 (3 ratios)	< 4	IP 65
	NE	Spur	In-Line	NEMA 23 to 42 (3 sizes)	50 to 350	3 to 100 (9 ratios)	< 10	IP54
	NR	Bevel / Spur	Right Angle	NEMA 23 to 42 (3 sizes)	50 to 350	1 to 100 (10 ratios)	< 15	IP54

► Management Behind The Motion

All the machinery and technology in the world means nothing without skilled people to drive it forward. In 1986, Harvard Business School graduate Avi Telyas purchased a somewhat out-of-date gearing operation (then known as Bayside Controls) and began shaping it into the company you know today. By creating an open and progressive management structure and investing in employee development, Telyas and his management team soon developed a company that could build the precision motion control products their customers desired.



Continuing Education

Employee education has been instrumental in Bayside's success and growth. Most salespeople are degreed engineers. All employees attend Bayside University, an in-house school for personal and professional development. Professors from local colleges come to Bayside and teach courses from marketing to new technological advances.

Today, Bayside is a multi-national company of over 150 people, supplying precision electrical and mechanical products and systems for a wide variety of industries. It is the Bayside philosophy that quality solutions can only come from quality people.



Cellular Manufacturing

At the beginning Bayside workers toiled in separate departments, performing single operations on batches of parts. This was replaced by cellular manufacturing, where small, self-contained cells of employees make a product from start to finish. Frequently utilized by Japanese companies, this structure allows employees to become self-sufficient, creative and flexible. They take pride in and responsibility for their work, yielding a quality product in a fast, flexible system. Moving beyond the Japanese model, Bayside encourages a high level of competition between cells and provides incentives based upon team performance. This aggressive approach to cellular manufacturing enables Bayside to quickly deliver high quality products.



No Walls, No Limits

Bayside's commitment to an open, creative environment is reflected by our facility. Our headquarters has virtually no interior walls. The cellular structure extends from the factory floor to top management executives working in an open environment arranged by functions and teams, not hierarchy. Ideas, knowledge and technology are allowed to flow freely.

Our "no boundaries" attitude pervades our factory as well. Each manufacturing cell contains a PC linking its CNC machinery to the rest of the company. All employees have access to design, manufacturing, sales, and even financial information. This open communication eliminates errors and promotes an open, team-oriented environment.

▶ State-of-the-Art Facilities & Capabilities

Bayside has a completely integrated facility for designing, testing, and manufacturing precision motion products. Our fully-automated factory in Port Washington, NY has been featured on the CNN show "Managing With Lou Dobbs" as a model of efficiency and modern manufacturing techniques.

Research & Development

We maintain a full-time testing, metallurgical, electronic, and R&D laboratory on-site and our engineers have obtained over 50 U.S. patents. Most recently, our innovative ServoMount® motor mounting system (used in our Stealth Planetary Gearheads), AutoFlex® system (used in our linear motor slides) and unique Two Wire® servo motor have been awarded U.S. design patents.

Some of our testing capabilities include:

- ▶ Metallurgical analysis
- ▶ FMEA (Failure Mode Effect Analysis)
- ▶ Finite element analysis
- ▶ Dynamometer testing
- ▶ Vibrational testing
- ▶ Data acquisition
- ▶ Computer Controlled backlash testing
- ▶ Laser interferometer calibration

Manufacturing

Bayside has complete solid-modeling design capabilities, automated CNC machining in a cellular environment and in-house precision gear, linear motion and brushless motor manufacturing. Bayside even has a plasma nitriding facility for heat treating high precision helical gears. State-of-the-art manufacturing facilities, combined with the responsiveness of cellular manufacturing, provide Bayside customers with short lead times on standard or special products.



Highest Standards

Bayside's quality system is built on aerospace standards and is approved to MIL-I-45208A. In fact, 8 of Bayside's standard gearheads (with no modifications in materials or manufacturing) were fully approved by NASA for space travel on the successful mission to repair the Hubble telescope. The U.S. Army's Bradley Fighting Vehicle uses Bayside's Linear Actuators for target manipulation. Bayside's brushless motor technology provides power steering for General Motors' new electric vehicles. Many other large customers, such as Motorola and Sundstrand Aerospace, also approve of Bayside's quality system.



Quality Control

Bayside has a completely climate-controlled facility, and uses quality controls such as SPC, on-machine probing and 100% final inspection of all products to ensure that the company's quality is maintained at the highest possible level. Bayside is a member of AGMA (American Gear Manufacturing Association), AHTD (Association of High Tech Distributors) and AIME (American Institute of Motion Engineering). Our company's engineers frequently present and publish technical papers at gearing, manufacturing, and motion control conferences.

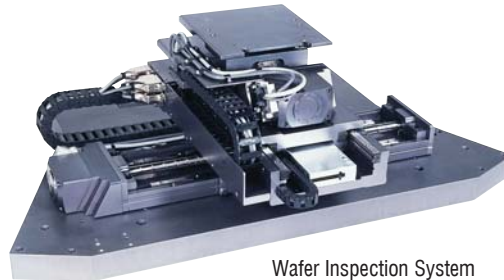
▶ Engineered Solutions

- ▶ Clean Room
- ▶ Vacuum Rating
- ▶ Sub Micron Precision
- ▶ Short Move & Settle Time
- ▶ High Natural Frequency
- ▶ High Band Width
- ▶ Linear Motor Drives

Resources & Capabilities

● A Commitment to Excellence

Bayside's Engineered Solutions Group is comprised of a uniquely qualified team of application, design and manufacturing engineers who are committed to provide Bayside's customers with innovative, reliable and cost effective positioning system solutions for their manufacturing processes.



Wafer Inspection System

● Ideal Infrastructure

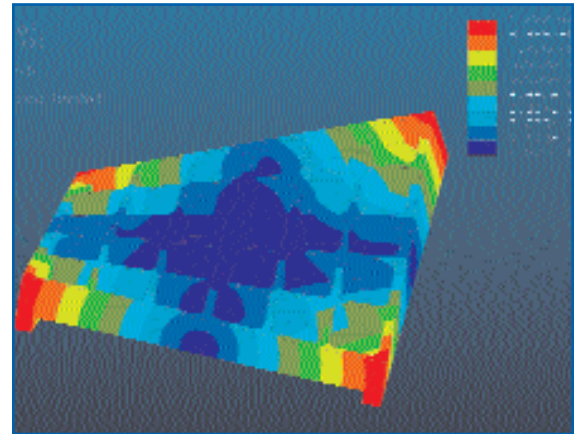
Bayside's Engineered Solutions Group is supported by an effective, broad based, corporate infrastructure. From one location, Bayside designs and manufactures a wide range of motion control products, including linear positioning slides and stages, rails, motors, drives, controllers, gearheads and gearmotors. This capability provides an ideal infrastructure for cost effective engineered solutions since they can be designed, built and integrated at one location into a single robust system.



Electronic Chassis

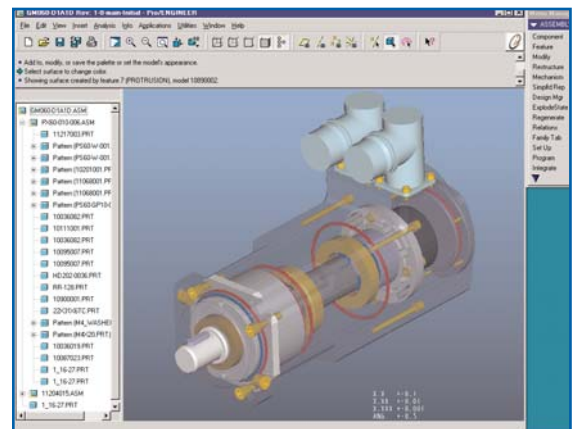
● Professional Capabilities

Bayside's Systems Solution Group strives to become your dependable motion control positioning solution provider, and play a strategic role in achieving your new system development objectives. We follow your needs from the very early stages of conceptual ideas,



"FEA" Simulation

through a rigorous definition of system requirements, which in many cases we assist in developing. As partners, we may conduct various feasibility testing for verification of new ideas to meet challenging environmental conditions such as high vacuum, low magnetic field, tight space, high temperature and ground vibrations. These tests are conducted to assist us in providing you with our best possible recommended solution.



Pro/ENGINEER CAD Platform

● Strategic Partnership

Bayside's Engineered Solutions Group has one main objective; to take your manufacturing process needs from concept to successful completion. Through an open channel of communication and joint planning, Bayside's Engineers will develop a cost effective solution that meets or exceeds your expectations. Bayside is looking forward to establishing a long term strategic relationship with your company and project development team.

Bayside's Six Step Project Process

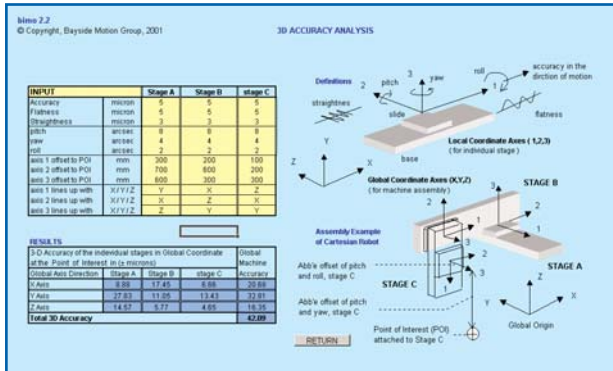
1 Understanding the Need

Whether your project is related to building semiconductor wafer processing machines or high precision general manufacturing equipment, Bayside's first objective is to understand your engineering needs.

Our Industry Specialists review your positioning specifications for completeness, clarity, consistency and feasibility; as well as the value that each required specification has towards the desired manufacturing process.

2 System Analysis

Once an engineered system and its requirements have been reviewed and defined, Bayside's engineering team uses a proprietary software (BIMO) to gain a better qualitative understanding of the proposed system value as well as a quantitative understanding of optimal component sizing.



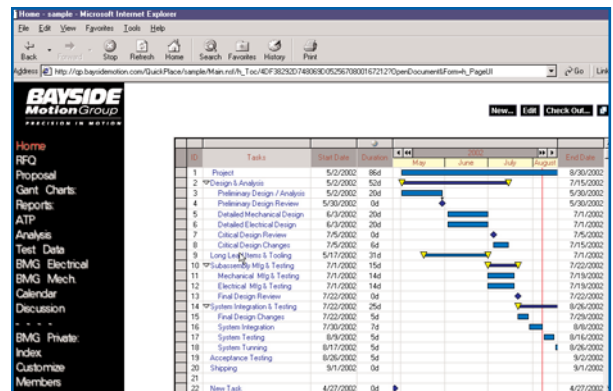
BIMO Analysis Tool

3 Solution Proposal

Equipped with an in-depth understanding of the need and a proposed solution, our system application engineers prepare a detailed document which highlights the requirements, cost effectiveness of various solution options, recommended configuration, selected components, price quotation, and delivery schedule.

4 Project Management

Each engineered system is assigned and led by a Project Manager who is responsible for ensuring that the projects process is begun and completed in a smooth, orderly and precise manner. To ensure accurate, up-to-date communication, the Project Manager utilizes a secured, web-based communication tool (QuickPlace) to keep all involved parties apprised of the project progress and details. The detail kept in the quickplace includes: Project Members, RFQ, Proposal, ATP, Gantt Charts, Tasks, Reports, System Analysis, Test results, Electrical Engineering, Mechanical Engineering and Discussion History.



View of QuickPlace

5 Acceptance Test

The Acceptance Test Procedure (ATP) is a mutually agreed upon document, which outlines the procedures, tools and methods used to verify that all project performances meet desired specifications. The acceptance test procedure is prepared well in advance to allow for the customer representatives to review it prior to their presence in this stage of the project.

6 After Sales Support

When the engineered system has been accepted by the customer, a Bayside engineer is assigned to follow up the delivery at the customer's site. The engineer inspects the machine and powers it up, training is also provided to the customer on site to assure proper readiness to start operation and maintain the machine.

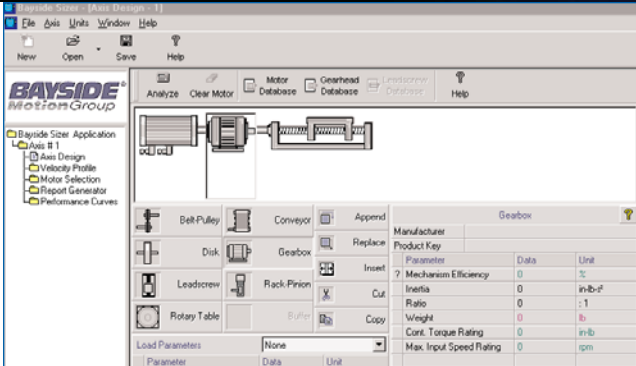
Throughout the life cycle of the machine, Bayside continuously monitors the status of the project and provides quick support when needed.



Acceptance Testing

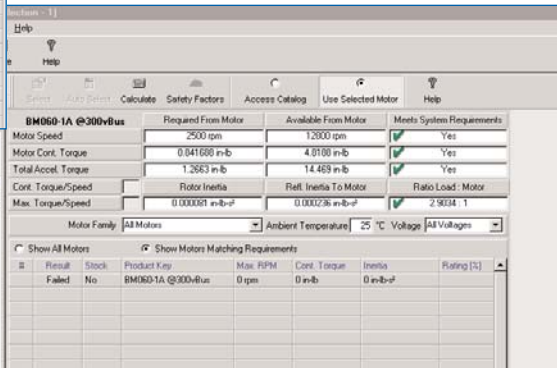
Software Tools

Motion Workbench



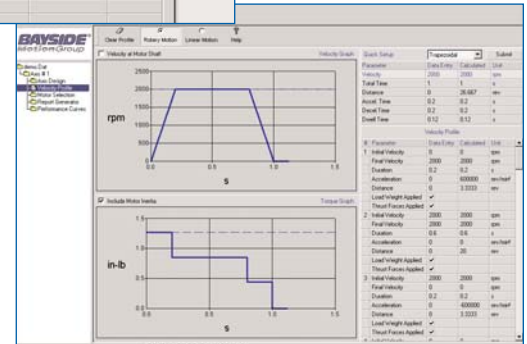
Axis Design

Selection of components and entry of parameters to build an axis. The selection component will appear on screen as a graphical symbol.



Motor Selection

Selects motors that meets system requirements and generates report with performance curve.



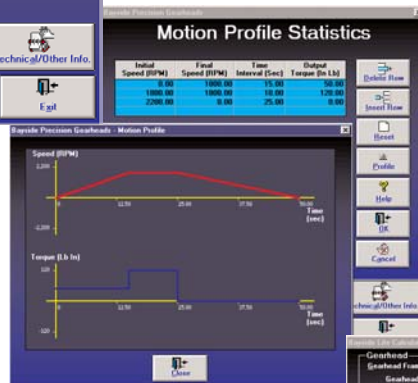
Velocity Profile

Entry of data for a specific velocity profile. As data is entered for accel, decel and dwell the profile is graphically shown

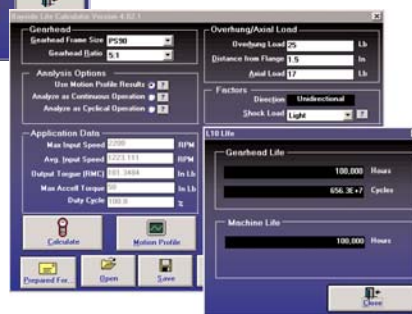


Entry of application data for speed, torque, duty cycle loads and shock.

Life Estimator



Profile - Entry of data for a specific velocity profile for each selections of accel, decel, and dwell. It is also shown graphically.

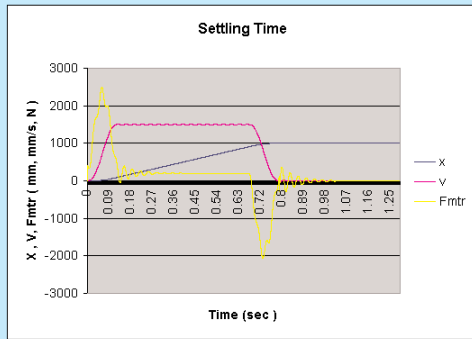


L10 Life - Creates detailed application report and gearhead life

bimo 2.2
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system requirements		input	
system position bandwidth	hz		30
system damping coefficient	-		0.1
structural damping coefficient	-		0.06
moving mass	kg		10
resistance force during cv	N		20
resistance force during ramp	N		20
smoothness of motion during cv	%CV		0.01
position accuracy during dwell	mm		0.001
chart scale factors		results	
motor force scale factor	N		0.1
position scale factor	mm		1
velocity scale factor	mm/s		1
settling time and distance		results	
settling time during cv	sec		0.2958
settling distance during cv	mm		428.6815
settling time during dwell	sec		0.2968
integration stability		results	
actual integration time interval	sec		0.00013
max recommended time interval	sec		0.00067
estimated machine requirements		results	
resonance magnification	db		18.42
machine stiffness	N/mm		3344.01
estimated natural frequency	hz		92.08
(assume 60 db/dec at resonance)			

SETTLING TIME ANALYSIS



motor requirements		results	
continuous force	N		63.61
peak force	N		248.55
duty cycle			0.07

BIMO

(Bayside Integrated Motion Optimizer)

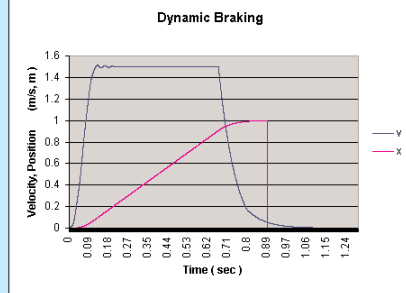
The dynamics and settling analysis assist in selecting the required motor forces needed to drive the stage in a motion profile, which is determined at the kinematic analysis phase.

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MOTOR / AMPLIFIER SIZING

force requirements		transfer value	
motor continuous force	N		63.61
motor peak force	N		248.55
(note: without coil mass and attraction)			
input company / motor selection		company	select model
		KOLLMORGEN	IL-12-030-A4
		TRILEGY	IL-12-050-A1
			270
motor specifications		catalog specifications	
company / motor model		KOLLMORGEN	IL-12-030-A4
continuous force	N	76	IL-06-075-A1
peak force (1 sec)	N	240	IL-06-075-A4
force constant (3 phases)	N/Arms	8	IL-06-100-A1
back emf constant (ptn/rms)	V/m/sec	4	IL-12-050-A1
resistance @ 25C (ptn)	Ohm	0.4	IL-12-050-A2
electrical time constant	msec	0.21	IL-12-050-A4
slider mass	kgm	0.42	IL-12-075-A1
magnet pitch	mm	18	IL-12-075-A2
magnetic attraction	N	0	IL-12-075-A4
thermal resistance	°CA/Watt	0.80	IL-12-100-A2
power loss (ptn / 125C)	Watt	131	IL-12-100-A4
maximum coil temperature	°C	130	IL-18-030-A1
motor temperature		results	
coil temperature (above ambient)	C		76.11
safety margins		results	
continuous current	%		19.48
peak current	%		-3.44
coil temperature	%		41.45

company: KOLLMORGEN initial velocity: 1500 mm/sec
 motor: IL-12-030-A4 crash velocity: 54.01226 mm/sec
 energy to absorbed: 0.0145877 joule



amplifier requirements		results	
continuous current	Arms		7.57
peak current	Arms		28.59
DC bus voltage	V		40.78

The linear motor and amplifier analysis selects the motor which meets the force requirements obtained from the dynamic analysis.

The 3-Dimensional accuracy analysis determine the effects of sensor stages parameters, assembly configuration and Abbe offsets on the overall accuracy of the machine.

bimo 2.2
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3D ACCURACY ANALYSIS

INPUT		Stage A	Stage B	stage C
Accuracy	micron	5	5	5
Flatness	micron	5	5	5
Straightness	micron	3	3	3
pitch	arcsec	8	8	8
yaw	arcsec	4	4	4
roll	arcsec	2	2	2
axis 1 offset to POI	mm	300	200	100
axis 2 offset to POI	mm	700	600	200
axis 3 offset to POI	mm	600	300	300
axis 1 lines up with	X/Y/Z	Y	X	Z
axis 2 lines up with	X/Y/Z	X	Z	X
axis 3 lines up with	X/Y/Z	Z	Y	Y

RESULTS				
3-D Accuracy of the individual stages in Global Coordinate at the Point of Interest (in microns)				
Global Axis Direction	Stage A	Stage B	stage C	Global Machine Accuracy
X Axis	8.88	17.45	6.66	20.68
Y Axis	27.83	11.05	13.43	32.81
Z Axis	14.57	5.77	4.65	16.35
Total 3D Accuracy				42.09

