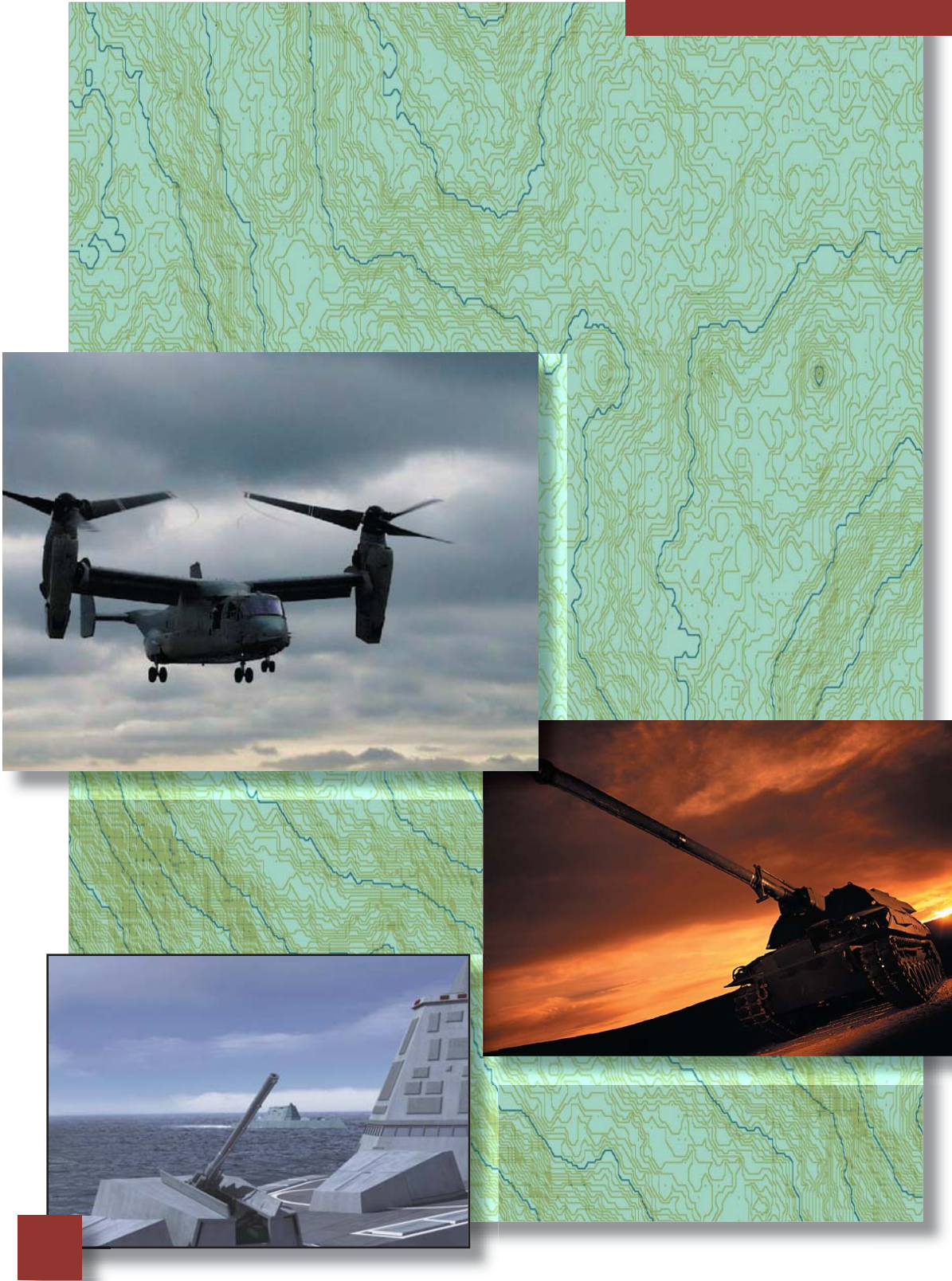


**Advanced Electro-Mechanical  
Actuation Technology for  
Military and Aerospace**



**EXLAR**  
*...goes the distance*

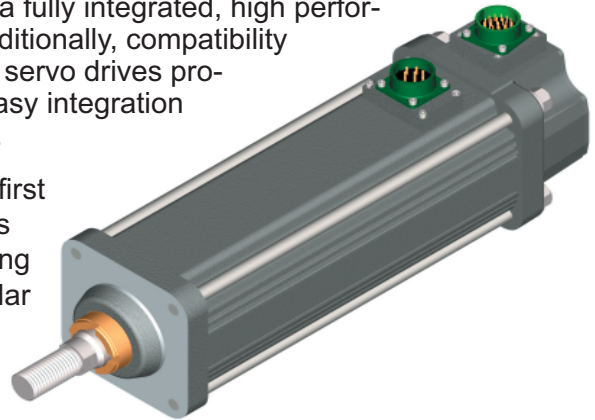
## Engineered to Outperform the Competition



An effective motion control actuation solution must be able to operate for thousands of hours under heavy loads. As a viable alternative to traditional solutions, an advanced solution must also be clean, fast, accurate, efficient, smooth and responsive. Whether controlling fuel flow or loading munitions, accurate and repeatable control must be the heartbeat of a well-engineered motion control solution.

With the force of hydraulics and the speed of pneumatics, Exlar's linear actuators offer a fully integrated, high performance package. Additionally, compatibility with a wide variety of servo drives provides flexibility and easy integration into existing systems.

Since delivery of our first actuator to the world's largest liquid packaging company in 1993, Exlar has supplied tens of thousands of actu-



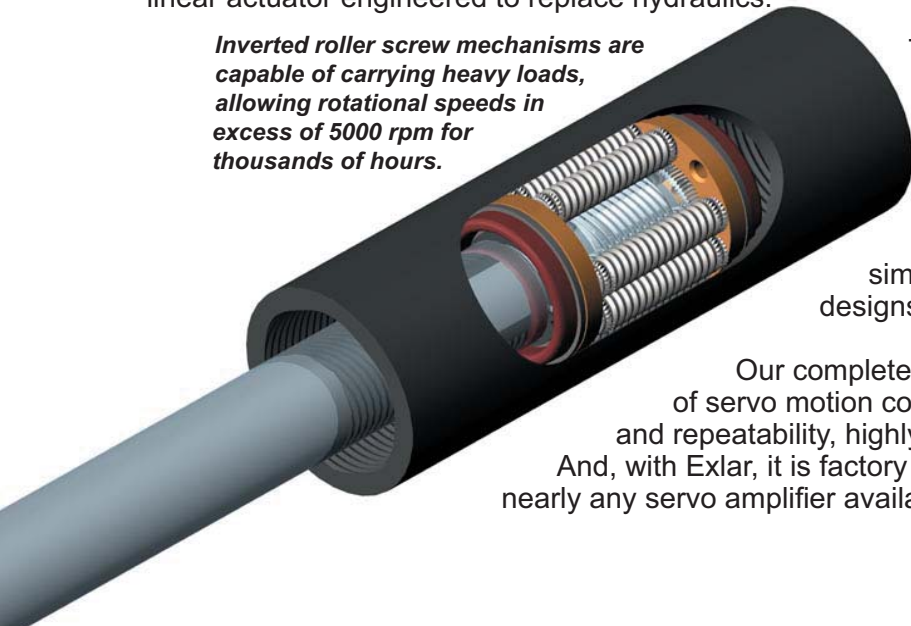
ators producing highly robust and accurate linear motion in industries including military and aerospace, automotive, glass and plastic manufacturing, food processing, power generation and factory automation.

### Using the Physics of Power and Motion

Exlar actuators differ from other actuators on the market by the use of satellite planetary roller screws. Fully utilizing the physics of power and motion, roller screws are unmatched at converting rotary torque into linear motion. Unlike acme or ball screws, roller screws are capable of carrying heavy loads and allowing rotational speeds in excess of 5000 rpm for thousands of hours in the most arduous conditions. This makes roller screws the ideal choice for demanding, continuous-duty environments.

Exlar's design expertise and the mechanical superiority of roller screws to other electromechanical devices led to the development of a unique solution featuring inverted planetary roller screw integrated in a brushless servomotor. This patented design utilizes a long threaded cylinder with the roller and screw assembly traveling inside the cylinder. The result is an extremely compact, efficient, high performance linear actuator engineered to replace hydraulics.

*Inverted roller screw mechanisms are capable of carrying heavy loads, allowing rotational speeds in excess of 5000 rpm for thousands of hours.*



The operation of Exlar actuation is similar to fluid power actuation. Speed, thrust, and stroke are programmable, easing system retrofits. Available with a variety of mounting options, even the form factor is similar to hydraulic and pneumatic cylinders, making for a simple drop-in replacement to existing system designs.

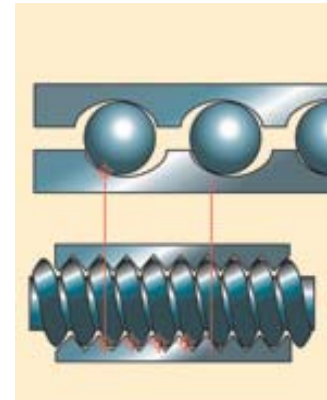
Our completely sealed package offers all the flexibility of servo motion control, including extraordinary accuracy and repeatability, highly responsive motion and simple set-up. And, with Exlar, it is factory tested and configured to operate with nearly any servo amplifier available today.

## Leveraging our Core Competencies

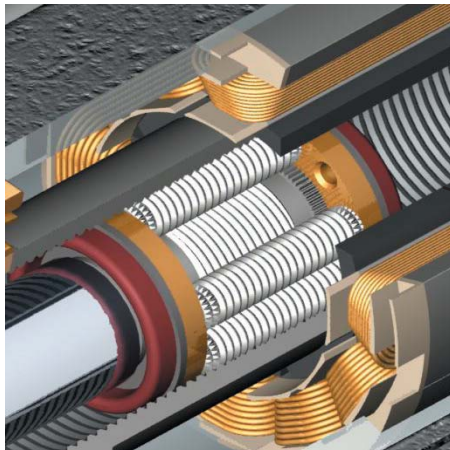
### Planetary Roller Screw Design

Exlar's planetary roller screw designs provide many more contact points than are possible on comparably sized ball screws. Increased contact points mean higher load carrying capacities, plus improved stiffness. Additionally, the smooth operation of roller screws versus the colliding balls in a ball screw translates to higher speeds. Comparatively, Exlar's designs provide as much as 2-1/2 times the rotational speed and 15 times the service life of similarly sized ball screws.

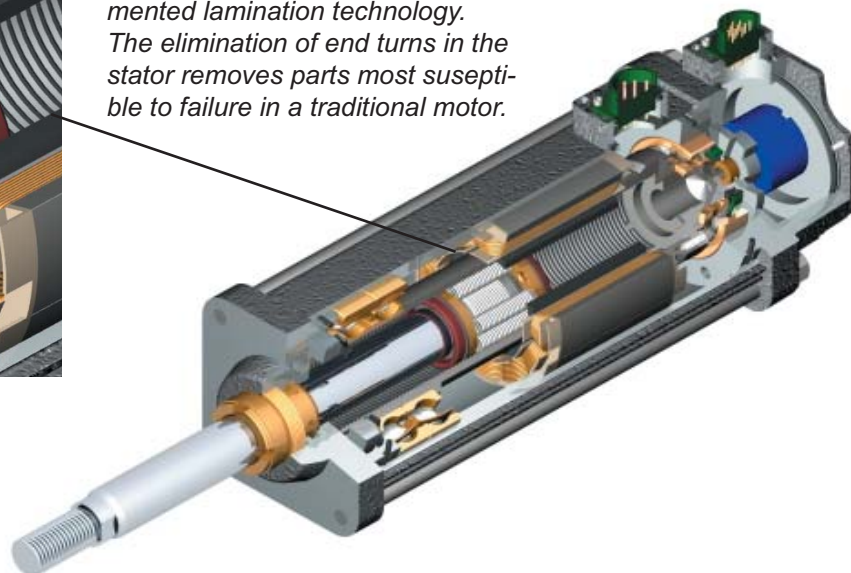
Having passed testing to military standards for shock (MIL-S-901D) and vibration (IL-S-167-1), Exlar actuators provide the robust design necessary for rugged environments.



*Compare the number of contact points between ball screw and roller screw components.*



*The magnified view shows segmented lamination technology. The elimination of end turns in the stator removes parts most susceptible to failure in a traditional motor.*



### T-LAM™ Segmented Stator Motor Design

Exlar's actuator design integrates the above described roller screw mechanism with a brushless servo motor. To improve efficiencies of the motor's performance, Exlar developed a segmented lamination stator technology which delivers a higher continuous motor torque than available in traditionally wound motors. T-LAM™ consists of stator segments, each containing individual phase wiring. This results in limited heat generation qualities which in turn improve motor efficiencies.

These advances in high performance brushless motor technology have been applied to rotary actuation as well. Exlar offers a complete line of brushless servomotors and gearmotors in three frame sizes, ranging from 7 to 7,000 inch pounds of torque. These rotary products provide the highest torque-to-size ratio available in motion control today.

By providing longer life and higher forces, Exlar is able to solve a wide range of applications previously not serviced by electromechanical actuation. High customer satisfaction ratings exemplify our commitment to reliability and performance provided through innovative products and dedication to quality manufacturing. We take great pride in the innovation and development of superior performing quality products. Our broad range of solutions combined with solid engineering and product quality testing has earned us the confidence of customers whose products are used throughout the world.

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## Meeting Your Requirements

Military and aerospace applications present demanding and varied requirements. Exlar actuators provide versatile, robust solutions well-suited to this industry.



### Compact Package

Reduced combat susceptibility and a compact package size make Exlar actuators a superior hydraulic replacement for applications such as munitions loading in combat vehicles where size and weight are critical.

### Accurate Positioning

Exlar actuator's lighter weight and simple logistical set-up are an exceptional fit for cargo loading conveyors and rear hatch positioning on lightweight armored supply vehicles.



### Rugged Construction

Exlar actuators are used for stringent applications subjected to military specifications for temperature, humidity, shock and vibration including testing to MIL-S-167-1 and MIL-S-901D.

Whatever your application, Exlar offers compact, reliable and all-electric actuator solutions. Exlar actuators offer a clean and efficient alternative to hydraulic and pneumatic cylinders with the power, speed and robustness customers require, while delivering up to 15 times longer life than a ball screw or acme screw.

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## Exceeding Your Expectations



### Explosion-Proof

Explosion-proof ratings, unmatched accuracy and expert valve mount engineering provide long life capabilities for harsh, high temperature fuel flow applications.

### Repeatable Performance

Exlar actuators provide the high force density, high duty cycle, repeatable force and accurate position control required for munitions positioning and cannon recoil.



### Custom Designs

By using specialized housing material and pressure compensation, Exlar actuators withstand subsea conditions while providing control position of towed array sensors.



Exlar military and aerospace customers include General Dynamics, BAE/United Defense, NASA, ITT, Northrop Grumman, Raytheon, Rolls Royce, the US Navy, the US Army, The Boeing Company and Bell Aerospace. Other Exlar customers include automotive manufacturers such as Ford, Chrysler, General Motors and Honda, and food packaging and processing giants such as Nestle, General Mills, Tetra Pak and Kraft. Industrial users include Owens-Illinois, Milacron, Lamb, Ingersoll and Caterpillar.

## Providing Superior Products

With a unique product offering, Exlar has extended the limits of conventional motion control to provide longer life than traditional electromechanical products.



### GSX Series Linear Actuator

GSX Series Linear Actuators offer the highest performance, longest life and most compact linear actuators on the market. Exlar's GSX Series linear actuators combine the advantages of our patented roller screw technology and T-LAM motor technology to create the stalwart of the Exlar product line. With force ratings available in excess of 12,000 pounds and speeds up to 40 inches per second, the GSX Series linear actuators offer a viable, long life alternative to hydraulic actuation.

Frame Size in (mm)	Stroke Length in (mm)	Continuous Force lb (N)	Speed in/sec (mm/sec)
GSX20 2.25 (57)	3 - 12 (75 - 300)	92 - 578 (409 - 2571)	8.33 - 33.33 (212 - 847)
GSX30 3.125 (79)	3 - 18 (75 - 455)	166 - 1347 (738 - 5992)	5 - 25 (127 - 635)
GSX40 3.9 (99)	6 - 18 (150 - 455)	319 - 3966 (1419 - 17642)	5 - 37.5 (127 - 953)
GSX50 5.0 (127)	6 - 14 (150 - 355)	513 - 8544 (2282 - 38006)	4 - 40 (101.6 - 1016)
GSX60 7.0 (178)	6 - 10 (150 - 250)	1275 - 12389 (5671 - 55109)	10 - 40 (254 - 1018)



### SR Series Linear Actuator

SR Series Linear Actuators are designed as a compact replacement for ball screw actuators. SR Series linear actuators provide an integrated package with higher speed and load capacity, and longer life than other traditional rotary to linear conversion mechanisms.

Frame Size in (mm)	Stroke Length in (mm)	Force lb (N)	Speed in/sec (mm/sec)
SR21 2.25 (57)	3 - 12 (75 - 300)	92 - 578 (409 - 2571)	8.33 - 33.33 (212 - 847)
SR31 3.3 (84)	3 - 18 (75 - 455)	166 - 1347 (738 - 5992)	5 - 25 (127 - 635)
SR41 3.9 (99)	6 - 18 (150 - 455)	319 - 3966 (1419 - 17642)	5 - 37.5 (17 - 953)

## Providing Superior Products

### FT Series Actuator

Utilizing roller screw technology and an external motor, the Exlar FT Series linear actuators provide force ratings in excess of 40,000 pounds, stroke lengths up to 8 feet and speeds up to 60 inches per second.



Frame Size in (mm)		Stroke Length in (mm)	Cont. Force lb (kN)	Speed in/sec (mm/sec)
FT35	3.5 (89)	6 - 48 (152 - 1219)	2000 (8.9)	14.7 - 59.3 (373 - 1500)
FT60	6.0 (152)	12 - 48 (305 - 1219)	10000 (45.4)	7.9 - 39.0 (201 - 1000)
FT80	8.0 (203)	12 - 48 (305 - 1219)	20000 (90.8)	6.9 - 34.4 (175 - 875)

### SLM Series Brushless Motor and SLG Series Brushless Servo Motor

Designed with Exlar's T-LAM technology, SLM brushless servo motors and SLG gearmotors provide efficient and powerful motors in small packages. The SL Series design yields 35-70% more torque than traditionally wound motors of the same size.



Frame Size in (mm)	Torque lb-in (Nm)	Speed rpm	Gear Reduction
SLM/SLG060 2.36 (60)	7.6 - 15.0 (0.86 - 1.69)	5000	4:1, 5:1, 10:1, 16:1, 20:1,25:1, 40:1, 50:1 and 100:1
SLM/SLG090 3.54 (90)	23.8 - 55.8 (2.69 - 6.30)	4000	
SLM/SLG115 4.53 (115)	75.8 - 177.1 (8.57 - 20.01)	3000	

With a variety of housing options – from stainless steel to food grade coatings to explosion proof packaging, or special travel options like an electric brake, end of travel sensors and anti-rotate assemblies, Exlar actuators and motors can be customized to solve almost any motion control application. Exlar Corporation goes the distance as a leading provider of electromechanical motion control solutions. And, as North America's only manufacturer of roller screws, our history, experience and dedication to the highest quality solutions on the market make Exlar the first choice to meet your motion control requirements.



Headquartered in suburban Minneapolis, Minnesota, Exlar Corporation serves a global customer base with an extensive standard product line and complete engineering support for custom applications. Visit [www.exlar.com](http://www.exlar.com) for a full listing of representatives worldwide.

