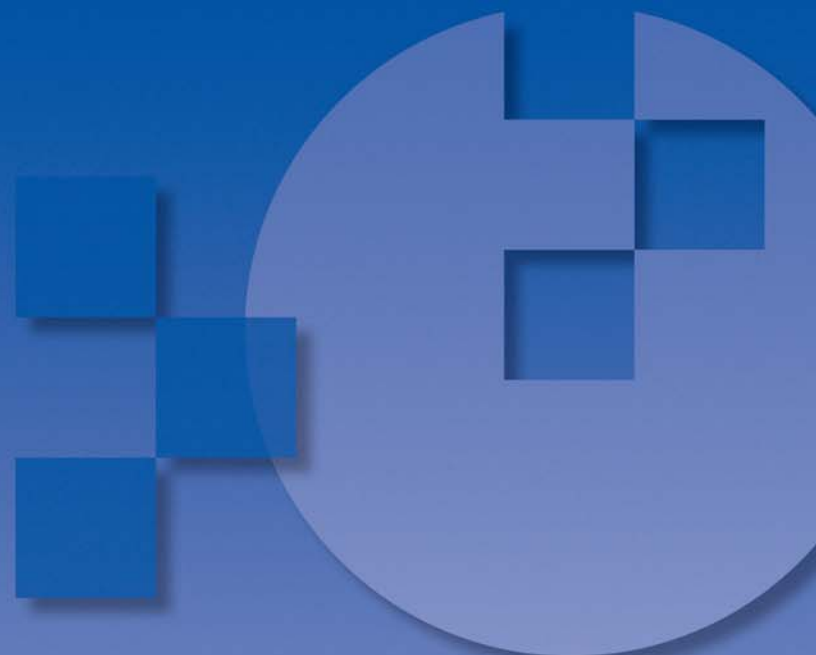




**Lightning**<sup>™</sup>  
Digital Scanners



## MPower<sup>™</sup> Motors

The Design that Integrates Mirrors, Mounts and Motors  
for Breakthrough Performance



# MPower Motors Will Make Your Designs Perform Better Than Ever.

The MPower Motor strategy is a three-step process that starts with mirror selection based on your operating wavelength, power, and beam diameter/spot size. Next, the mirror mounting scheme is addressed. We determine the optimal mount configuration for multiple mirror orientations and easiest field service. We also take care to ensure minimum system inertia and maximum mechanical stiffness. Finally, we match this mirror-mount configuration to the optimal motor based on your overall design goals.

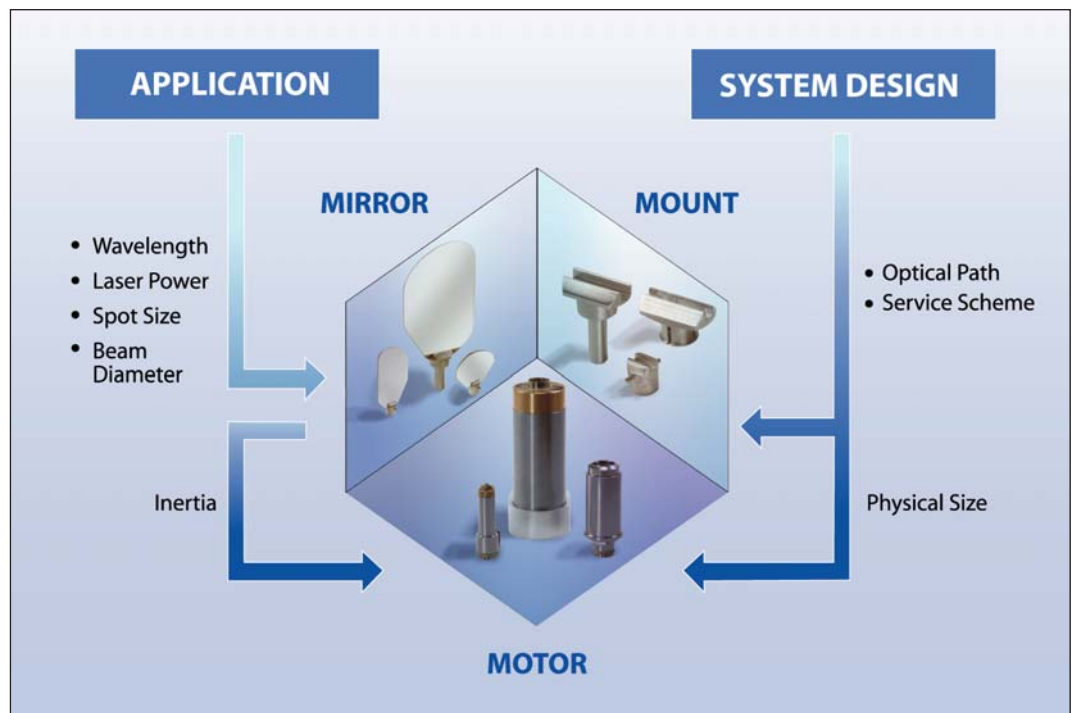
Treated as a system, the final MPower Motor configuration enables maximum operating efficiency and power transfer to the load. Heat build-up and other effects are minimized. You get the best performance and the highest bandwidth right out of the box. And that makes MPower Motors the next breakthrough in scanner motor design.

General Scanning invented the optical scanner over thirty years ago. Since that time, we have been improving and refining our designs. Now, we have achieved another breakthrough in motor design that will enable higher performance and greater throughput for your applications. We call it the MPower Motor design strategy.

A scanner is not simply a motorized mirror, it is a complex system whose performance can only be optimized when all of the inertial elements, the motor, the mount and the mirror, are designed and tested as an integrated working unit.

With the MPower Motor strategy, there is no need to search for the best combination of mirror, mount and motor, because we've done all the tests and analysis for you.

## MPower Motor Design Strategy



## High Performance Laser Quality Mirrors

MPower Motor selection begins with the element that is closest to your application, the mirror. Considerations such as wavelength, power, beam diameter and spot size will dictate the best mirror for your application.

Low inertia is essential for a beam-steering mirror to attain the highest acceleration, while high stiffness is needed to achieve adequate servo bandwidth. The reality, however, is that a balance must be struck between adequate stiffness and acceptable inertia. That means selecting the best alternative from a large array of mirror designs, or creating a custom mirror that matches your performance requirements.

In our thirty years of industry leadership, we at General Scanning have developed both. We have a complete line of optimized mirror designs in a clear aperture range of 4mm to 50mm. We also offer innovative mirror designs based on Beryllium and Silicon-Carbide substrates to achieve the highest stiffness-to-inertia ratio. And of course, we offer a custom mirror design capability to OEM customers.

Another patent-pending innovation from General Scanning is the high-power mirror. This mirror design is intended for use in applications with beam power levels up to 10 times higher than conventional laser mirrors. Most importantly, this design does not require active cooling. Regardless of your application requirements, the chances are we have the ideal mirror.

## Innovative Mirror Mounting Designs

Once the mirror for the MPower Motor has been selected, mounting options can be considered. For example, does the optical path require a special mirror orientation? Should the mounting scheme accommodate mirror replacement in the field?

General Scanning has developed several innovative mirror mounting designs for outstanding performance and flexibility. Options include direct mounting to the rotor shaft, a sleeve-mount design, our patent-pending tapered-mount design, and an integrated mirror-mount design. All of these configurations will provide you with the best balance of low inertia and high mechanical stiffness.

	Inertia	Stiffness	Field Replaceable	Adjustable Orientation
Direct mount to the rotor's shaft	Minimal	Best	No	No
Sleeve-mount on an Extend Shaft	Higher	Lower	Yes	Yes
Tapered-mount in thick-neck shaft	Lower	Higher	Yes	Yes
Integrated Mirror & Mount	Lower	Higher	Yes	Yes

## Optimized Motor Designs

The last aspect of our MPower Motor concept is the motor itself. The power transfer path in an optical scanner motor flows from the motor's stator to the rotor (motor efficiency) and from rotor to the load (inertia matching & mounting scheme). The ideal design combines a compact, high efficiency stator design and a rigid, low-inertia rotor-mount-mirror assembly.

Another important consideration is power transfer losses that are converted to heat. This heat must then be conducted to the case of the motor so it can be dissipated before the motor is overheated and damaged.

General Scanning's family of 4<sup>th</sup> generation motors was designed with optimized coil winding and forming techniques to improve both motor efficiency (power transfer to the rotor) and heat transfer (coil-to-case conductivity). This optimization also provides the best balance of torque and response-time.



## The MPower Motor Advantage

Increasing a scanner's performance, while reducing its power requirement in rapid motion applications, demands a motor solution with the lowest total inertia (rotor inertia + load inertia). But optimal performance, or power transfer from rotor to load, can only occur when the load inertia and the rotor inertia are similar. An efficient motor by itself does not insure optimal performance, yet matching the motor to the load does. And that is what the MPower Motor strategy is all about. General Scanning's wide variety of integrated MPower Motor solutions is sure to provide you with the best performance\* for your application.

\* MPower Motors perform best when coupled with General Scanning's analog or digital servo drivers.



Mirrors



Mirror Mounts



Motors

To learn more about the Lightning Digital Scanner platform, MPower Motors, and other General Scanning products, visit: [www.gs-scanners.com](http://www.gs-scanners.com) for all the details.

To learn more about GSI Group, visit our corporate website: [www.gsig.com](http://www.gsig.com)

General Scanning is the world's leading optical scanner company with offices in major industrial centers around the globe. As one of fourteen product brands that comprise GSI Group, we deliver enabling technology that brings advanced applications to life in the medical, semiconductor, electronics and industrial markets.

**GSI**

**Laser Systems**

**Precision Motion**

**Lasers**

**A World of Enabling Technologies**

Bringing Your Advanced Manufacturing Applications To Life

**Enabling Technology**

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