



Advantages Of Using ATLANTA Small Pinions

When it comes to selecting a pinion for use in a rack & pinion drive system, the pinion pitch diameter can have a huge effect on the system.

ATLANTA has a wide range of pinions, including ISO flanged pinions, which gives the design engineer flexibility to optimize his design.

The ATLANTA ISO flanged pinions have pitch diameters smaller than their bolt circle diameter, which reduces the torque and reduction ratio required. The linear backlash from the gearbox is also reduced since the pinion radius is smaller.



Another significant impact of using smaller pinions can be seen on the linear stiffness relating to the gearbox torsional rigidity. This linear stiffness is inversely proportional to the square of the pinion diameter; therefore, using a pinion half of the size would improve the linear stiffness by a factor of four.

Example:

The best way to see all of the advantages of using smaller pinions can be seen in the below example.

A customer needs to move 7,000 lb. at a speed of 2,000 inches per minute, with an acceleration rate of 66.67 inches per second squared.

The acceleration force to make this move is 1,489 lb. A 40 tooth module 3.0 helical pinion was initially selected, and a 14 tooth pinion was selected to compare to.

System Parameter	Using 40-Tooth Pinion	Using 14-Tooth Pinion
Required Torque	311 lb.ft.	109 lb.ft.
Gearbox Size	140 mm	110 mm
Gearbox Ratio	20:1 (Two-Stage)	7:1 (Single-Stage)
Linear Gearbox Backlash	0.0022"	0.0008"
Linear Gearbox Stiffness	127 N/micron	533 N/micron
Resonant Frequency	31.86 Hz	65.22 Hz

From this example, it is clear that by using a smaller pinion, the required torque is reduced which allows us to use a smaller gearbox with a smaller ratio.

The linear backlash is reduced by two-thirds, the linear stiffness is increased by a factor of four and the resonant frequency of the system more than doubles!

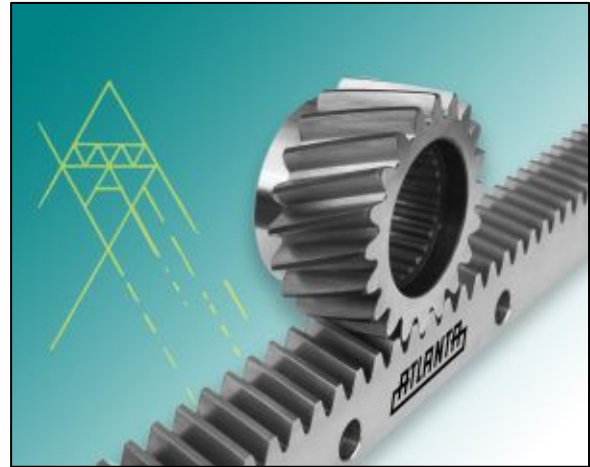
Conclusion

From the above example, the advantages of using ATLANTA small pinions can be easily seen:

- Reduced torque required
- Reduced gearbox ratio required, saving money
- Smaller gearbox can typically be used, saving money
- Smaller design envelope required
- Reduced linear gearbox backlash
- Increased linear gearbox stiffness
- Increased resonant frequency of system

ATLANTA Drive Systems, Inc. offers a complete range of standard Rack & Pinion Drive Systems, which are available in five levels of precision, including ultra-high precision zero backlash axis drives.

They are perfect for a wide range of applications, including axis drives requiring precise positioning & repeatability, traveling gantries & columns, pick & place robots, CNC routers and material handling systems. Heavy loads and duty cycles can also be easily handled with these drives.



Industries served include Material Handling, Automation, Aerospace, Woodworking, Machine Tool and Robotics.

This range of drive systems utilizes ATLANTA's wide range of rack & pinions, consisting of both helical & straight (spur) tooth versions, in an assortment of sizes, materials and quality levels. Rack quality levels include soft, induction-hardened, quenched & tempered and hardened & ground (DIN 3 to DIN 10, AGMA 8 to 12+).

Typical delivery time for these systems is only 2 to 3 weeks- ideal for OEM's requiring just-in-time delivery schedules. Special and/or modified designs are always possible.

For more information, contact ATLANTA Drive Systems at: (800) 505-1715, or on the web at: www.atlantadrives.com.