ATLANTA DRIVE SYSTEMS

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Advantages Of Using ATLANTA Long Gear Racks

When it comes to gear racks, their quality level denotes the accuracy of the teeth which is determined by the manufacturing process. The pitch error of a gear rack (known as GTf) is the deviation from the theoretical length and can affect the positioning accuracy of the axis.

Through continuous improvements in production techniques, ATLANTA has been able to reduce the total pitch error for the 1,000 mm long hardened & ground racks, while achieving significant reductions of the total pitch error of 1,500 mm and 2,000 mm long hardened & ground racks. Therefore, for long travel lengths, it is possible to minimize the total pitch error seen.

Using long racks reduces the number of rack sections, which reduces the amount of time needed to mount the racks. It is also advantageous to use longer racks to reduce the number of rack joints, which can induce further error into the axis.

ATLANTA's rack pitch error values for various quality levels are as follows:

Rack Quality	1,000 mm Rack (GTf/1,000)	1,500 mm Rack (GTf/1,500)	2,000 mm Rack (GTf/2,000)
5	0.026 mm	0.031 mm (0.021 mm/1,000 mm)	0.034 mm (0.017 mm/1,000 mm)
6	0.036 mm	0.043 mm (0.029 mm/1,000 mm)	0.047 mm (0.024 mm/1,000 mm)
7	0.052 mm	0.062 mm (0.041 mm/1,000 mm)	0.068 mm (0.034 mm/1,000 mm)

Mounting Example:

The best way to see the advantages of using long racks is the below mounting example comparing using 0.5, 1.0 and 2.0 meter long racks.

A customer has a machine with a travel length of 6 meters with the racks mounted end-to-end with companion rack.

Using 3 pieces of 29.40.205 DIN 6 helical module 4.0 hardened & ground two-meter long rack:

- Pitch error per rack GTf/2,000: 0.047 mm
- Pitch error at rack joints from using companion rack: < 0.025 mm
- Total pitch error: 3 x 0.047 (racks) + 2 x 0.025 (rack joints) = 0.191 mm
- Mounting screws required: 3 x 16 = 48
- Dowel pins required: Zero
- Rack joints: 2

Using 6 pieces of 29.40.105 DIN 6 helical module 4.0 hardened & ground one-meter long rack:

- Pitch error per rack GTf/1,000: 0.036 mm
- Pitch error at rack joints from using companion rack: < 0.025 mm
- Total pitch error: 6 x 0.036 (racks) + 5 x 0.025 (rack joints) = 0.341 mm
- Mounting screws required: 6 x 8 = 48
- Dowel pins required: Zero
- Rack joints: 5

Using 12 pieces of 29.40.055 DIN 6 helical module 4.0 hardened & ground half-meter long rack:

- Pitch error per rack GTf/500: 0.032 mm
- Total pitch error: 12 x 0.032 (racks) + 11 x 0.025 (rack joints) = 0.659 mm
- Mounting screws required: 12 x 4 = 48
- Dowel pins required: 24
- Rack joints: 11

To further reduce the total pitch error, the ATLANTA Rack Assembly Kit can be used instead of a companion rack:

The assembly kit consists of a measuring bridge, an adjusting device and magnetic rollers.

With this kit, it is possible to achieve near-perfect rack joints without adding error to the system.

The error at the rack joints can be reduced from < 0.025 mm when using a companion rack to < 0.005 mm when using the Rack Assembly Kit.

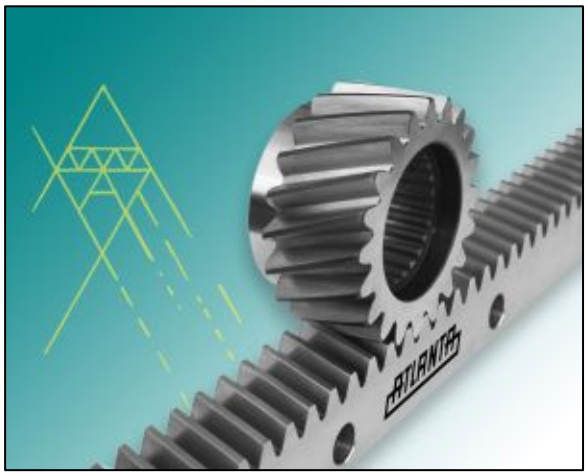
- Error at rack joints from Rack Assembly Kit: < 0.005 mm
- Total pitch error using 2.0 meter racks:: 3 x 0.047 (racks) + 2 x 0.005 (rack joints) = 0.151 mm (a reduction of ~21%)
- Total pitch error using 1.0 meter racks: 6 x 0.036 (racks) + 5 x 0.005 (rack joints) = 0.241 mm (a reduction of ~29%)
- Total pitch error using 0.5 meter racks:: 12 x 0.032 (racks) + 11 x 0.005 (rack joints) = 0.439 mm (a reduction of ~33%)

Conclusion

From the above examples, the advantages of using ATLANTA long gear racks can be easily seen:

- Reduced pitch error values
- Reduced number of rack sections required
- Reduced amount of time needed to mount the racks
- Reduced the number of rack joints

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.
