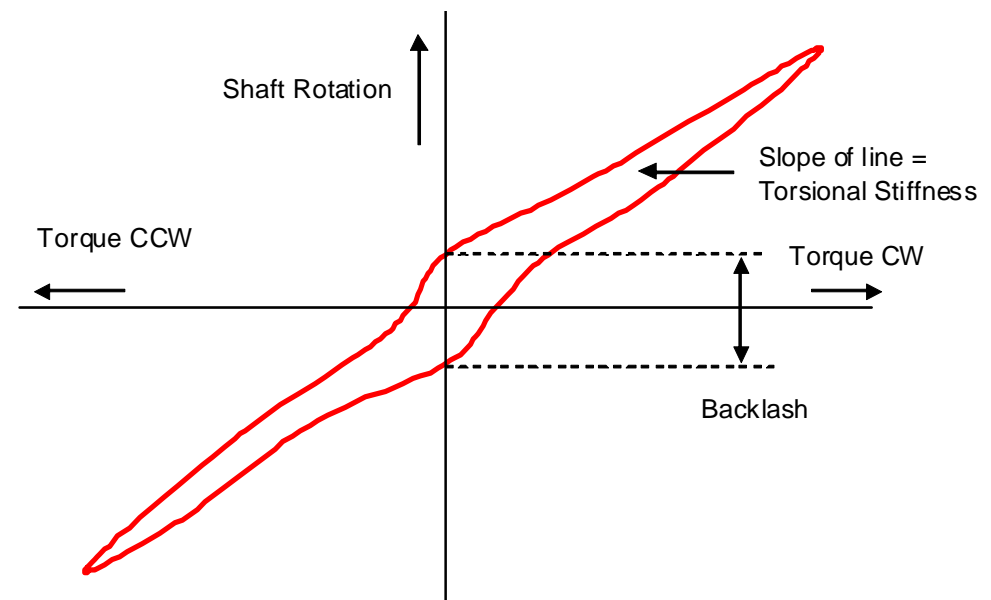


What is lost motion?

There is a certain amount of clearance needed in order for a gearhead to function properly. This helps avoid excessive heat or wear in the gearing and insures proper lubrication. Clearance in the gear mesh means there is a small gap between the gear teeth which leads to lost motion. The figure below shows the rotation of the geahead shaft with an applied load.

Lost motion basically occurs in two ways

- 1) Backlash – clearance between the gear teeth**
- 2) Torsional Stiffness – wind up within the gearhead.**



What is backlash?

Gearhead backlash is the angular rotation of the output shaft measured in arc-minutes ($1/60^{\text{th}}$ of a degree) in both directions. This is basically a measurement of the space between the gear teeth. There is no strict standard mandating how backlash should be measured for a gearhead. This leads to some confusion and misconceptions in the market concerning backlash, precision and lost motion. At Micron, Backlash is measured at 2% of the rated output torque and is a maximum value at every point on the output shaft for the life of the gearhead.



Title, Author, Date

Troubleshooting - Backlash

- Are you getting more lost motion in your application than you should?
- Reason's why some backlash ratings are not accurate.
 - 1) Zero backlash claims: For the reasons outlined on the previous slides, zero backlash is not possible in a planetary design. This is usually rounded down from a specification of <1 arc-min.
 - 2) Average value measurements: Some manufacturers may take an average of 4 or more points on the output shaft to come up with a backlash spec. For example, a unit with backlash measurements of 4, 6, 10 and 12 would have a rating of 8 arc-min. By Micron's standard, this is a 12 arc-min measurement.
 - 3) Lower Torque measurements: Instead of using 2% of the rated torque, some manufacturers may use 0.5% or less. Using a lower applied torque will produce a better backlash measurement.
 - 4) "Out of the box" ratings: Backlash will increase over time. This is why Micron's backlash is guaranteed for the life of the gearhead. Many competitors may send you an 8 arc-min gearhead but after six months, the backlash is up to 15. Knowing the accuracy of their machine over its lifetime is an important specification for most customers.

Micron Backlash Specifications

- *2% of the rated torque*
- *All points on the output shaft*
- *Maximum value for the life of the gearhead*