



# Gearhead Backlash and Lost Motion




## LOST MOTION

# 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.

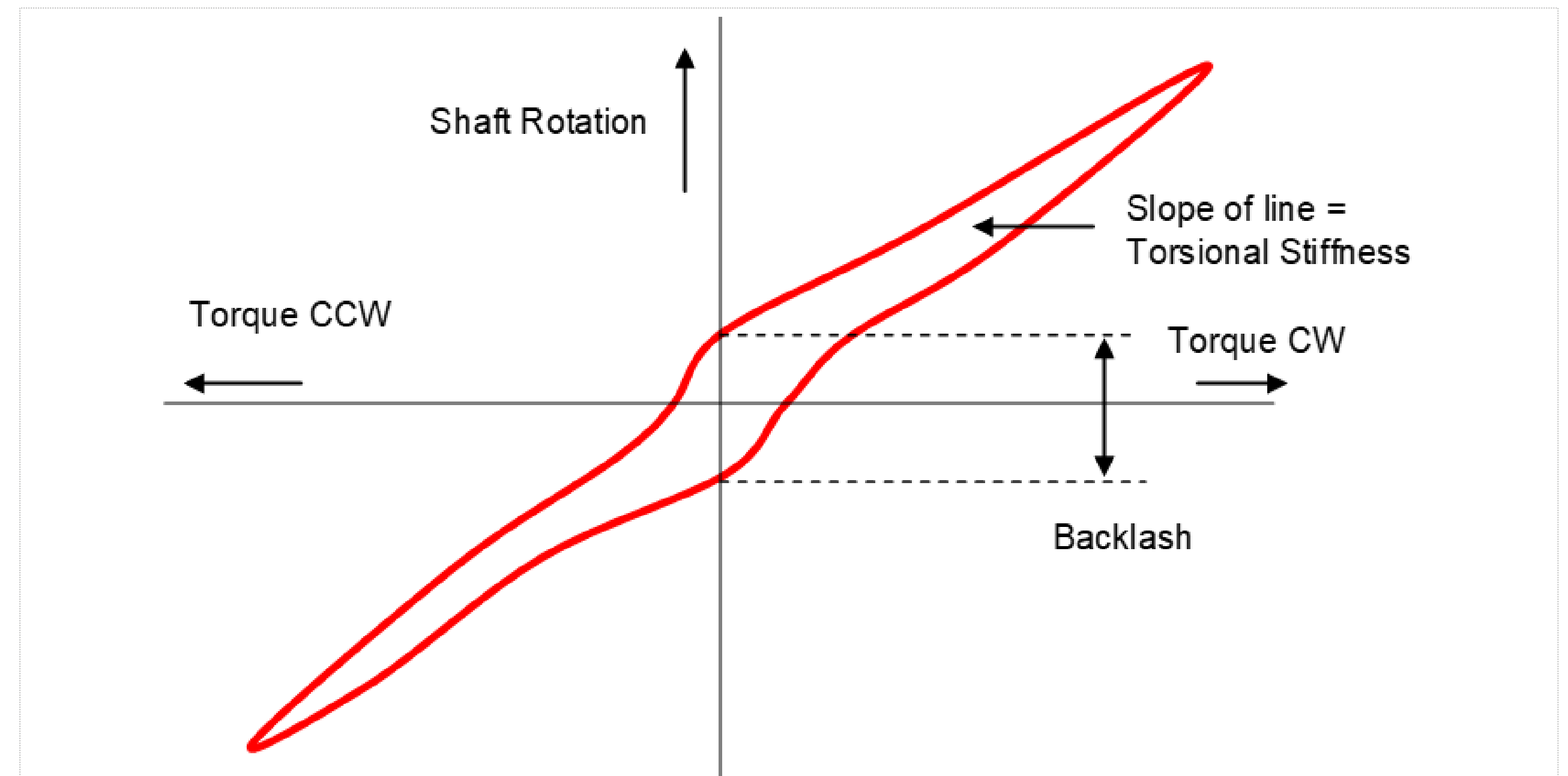
Clearance in the gear mesh means there is a small gap between the gear teeth which leads to lost motion. The figure below shows the rotation of the geahead shaft with an applied load.



# What is lost motion?

Lost motion basically occurs in two ways:

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





## BACKLASH

# 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



## BACKLASH


# What is backlash?

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.



# 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.
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## Are you getting more lost motion in your application than you should?

Reason's why some backlash ratings are not accurate:

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.






TROUBLESHOOTING

# Are you getting more lost motion in your application than you should?

## MICRON Backlash Specifications

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