



# MINIATURE PRECISION TORQUE SPLINES

## SPLINE TERMS

**EQUIVALENT DIAMETER** – The equivalent diameter is the average diameter between the root diameter and the shaft diameter.

**SHAFT DIAMETER** - The shaft diameter is the outside diameter of the inner race.

**ROOT DIAMETER** - The root diameter is the diameter of the inner race measured at the bottom of the groove. This is the diameter used for determining column strength, critical speed and machining dimensions.

**SPLINE TEETH** - The grooves in the inner race that mate with the outer race are referred to as the spline teeth. The number of teeth varies with the diameter of the spline shaft. (See below)

Spline Shaft Diameter	Number of Teeth
0.250" (6.35mm)	14
0.375" (9.52mm)	16
0.500" (12.7mm)	18

**STRAIGHTNESS** - Although Precision Torque™ Splines are manufactured from straight, cylindrical material, internal stresses may cause the material to bend. When ordering random lengths or cut material without end machining, straightening is recommended. Handling or machining of splines can also cause the material to bend. Before, during and after machining, additional straightening may be required. When ordering splines with machined ends from Helix Linear, the following straightness tolerances can be expected: Precision Torq™ Splines are straight within .003" in per foot when shipped from the factory, and do not exceed .030 inch in any 6 foot section.

**MAXIMUM TWIST** - Precision Torque™ Splines will have a maximum twist of 3°/ft about the Spline Shaft axis.

**ROTATIONAL LASH** - Backlash or lash is the relative rotational movement of an outer race with no rotation of the inner race (or vice versa). Rotational backlash for the Precision Torque™ Splines with standard bushing is limited to a range of .005" to .009" at the equivalent diameter.

**TEMPERATURE** – Precision Torque™ Splines will operate between -65°F and 200°F with proper lubrication.

**END MACHINING** - To obtain optimum performance of your spline assembly, it is recommended that the machining be performed at the Helix Linear factory. Splines may be purchased machined to your specifications.

**END FIXITY** - End fixity refers to the method by which the ends of the spline are supported.

**CRITICAL SPEED** - The speed that excites the natural frequency of the spline inner race is referred to as the critical speed. Resonance at the natural frequency of the inner race will occur regardless of orientation (vertical, horizontal, etc.). The critical speed will vary with the diameter, unsupported length, end fixity and rpm. Since critical speed can also be affected by shaft straightness and assembly alignment, it is recommended that the maximum speed be limited to 80% of the calculated value. The formula used to calculate critical speed is found on page 220. The critical speed chart can also be used to quickly determine the minimum diameter.