



Johnson Engineering

v-twin drivetrain performance

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TwistGear is designed and manufactured in the USA by:

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TwistGear is a 5th gear replacement delivering features and benefits not found in other designs and is currently available for 1991-up Evolution and Twin Cam 88 5-speed transmissions.

- Manufacturer: Johnson Engineering
- Product: TwistGear™
- Description: replacement gear set (5th)
- Application: 1991 — current Harley Davidson™ type 5-speed transmissions
- Design: helical cut gears
- Construction: nickel/chrome/molybdenum 8620 carburized steel
- Features:
 - reduced transmission noise
 - improved ratios (1-4)
 - easier 5th-gear shifting
 - better reliability
 - 50% more oil seal capacity
 - reduced drivetrain fatigue
 - longer gear and bearing life
 - negligible gear drag
 - in-bike installation
 - improved 'hole shot'
 - helps avoid stalling
 - eliminates excessive clutching
 - increased low speed control
 - 'overdrive' performance (w/sprocket or pulley change)
 - NO modifications to transmission case or gearsets
 - final drive reduction remains 1:1



Product Benefits

1) Helical Cut vs. Straight (Spur) Cut Gear Teeth

The usual reason helical cut gears aren't used is cost to manufacture. Not only do helical gears mesh more smoothly than spur gears, which have no helix or twist to ease engagement, they also increase the contact ratio. The result is superior tooth strength and reduced transmission noise.

TwistGear tooth strength is further enhanced by a high pressure angle and increased gear width. The helical gear twist delivers a face contact ratio of 1.1, resulting in at least 1 tooth in contact at all times. The involute gear

profile gives a contact ratio of 1.4, resulting in at least 1 tooth in contact at all times. Together, there are at least 2 gear teeth in contact at all times.

2) Stock vs. High Performance Bearing Strength

High and moderate horsepower applications generate lateral movement of the inner drawn cup bearing, which will eventually work its way out of the main drive gear. TwistGear replaces the use of this low-cost bearing with a high performance caged roller design capable of much higher load and torque than either OE or aftermarket bearings. Retained by snap rings on both sides, move-

ment is eliminated. In addition the replacement features 3.5 mm diameter heavy duty rollers, with three times the load bearing capacity of standard 2.5 mm diameter needles.

Typical trapdoors use deep-groove ball bearings, which when used in conjunction with a stock engine are adequate for TwistGear. Modified engines should use the JE four-point countershaft ball bearing replacement. The radial capacity of the JE four-point ball bearing is double that of deep groove designs, with a correspondingly huge increase in axial capacity. For highly modified engines, JE four-point ball bearings are required in both trapdoor bearing positions.

3) Superior One-Piece Design

Typical 5th-gear countershafts and gears are two separate pieces, resulting in a thin cross-section between the splines and teeth roots and a high stress concentration factor of 1.7. TwistGear's one-piece gear and countershaft has an ideal stress concentration factor of 1.0 for superior fatigue resistance and a significantly stronger piece.

4) Quicker Shifting, Lower RPM's

Replacing a stock ratio 32/17 or 41/22 5th-gear set with TwistGear's 41/20 ratio helical gears delivers 10% shorter 1st through 4th ratios, giving six speed performance without the fatigue of shifting or the expense of a new transmission. Lower cruising RPM's and improved gas mileage are achieved with a pulley/sprocket change, without sacrificing performance.

5) Easier Shifting Equals Better Performance

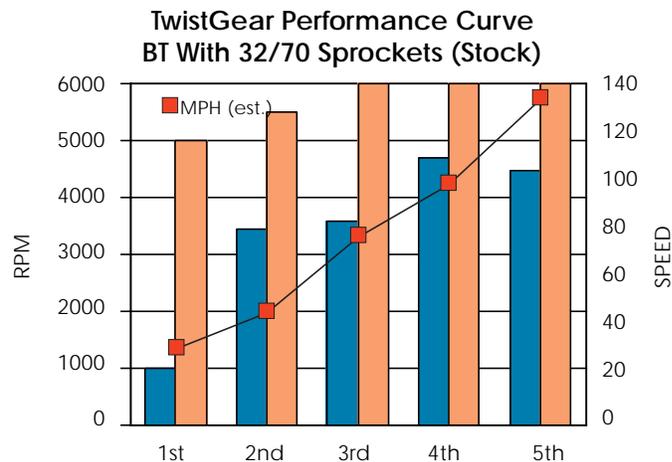
Better shifts result in faster acceleration and longer transmission life. Shifting into 5th-gear is much smoother due to increased clearance on the main drive gear dogs, which are back-cut for positive engagement. Porting the dogs is no longer necessary for high-speed shifts.

6) Improved Main Gear Oil Sealing Virtually Stops Leaks

The outer lips of an oil seal are designed to keep dirt and debris out of the inner oil sealing lip. TwistGear's main drive oil seal has three sealing lips for 50% greater capacity and longer seal life, compared to conventional seals with only two outer lips. In addition, our technically superior composition polyacrylate oil seals are rated to 340°F as further insurance against premature failure.

JE's main drive gear is delivered fully assembled and ready for installation. Transmission removal from the motorcycle or transmission case modification is not required.

Specifications	TwistGear	Stock	Stock
Ratio	41/20	41/22	32/17
Profile contact ratio	1.4	2.0	1.5
Face contact ratio	1.1	0	0
Total contact ratio	2.5	2.0	1.5
Pressure angle	29°	20°	20°
Gear width	0.92	0.82	0.82
Gear rim thickness	no rim	0.16	0.16
Rim stress factor	1.0	1.84	1.80



Above chart shows outstanding improvement in acceleration throughout the gears when TwistGear is installed using stock 32/70 pulley setup.

TwistGear is available in kit form or as individual parts.

- 1 TwistGear main drive gear (41T)
- 1 TwistGear countershaft (includes the 20T gear)
- 2 caged four-point ball bearing, trapdoor
- 1 caged roller bearing, main gear
- 1 drawn cup needle bearing, main gear
- 1 oil seal installed on main drive gear
- 1 triple-lip main drive gear oil seal
- necessary thrust washers and retaining clips