



30 YEARS **STRONG**

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***Safety Instructions, Warranty Information,  
and Manufacturer's Declaration for Attachments  
Manufactured By JEMMS-Cascade, Inc.***



***WARNING Read all safety warnings and all instructions before operating this attachment. Failure to follow the warnings and instructions may result in serious injury or property damage. Save all warnings and instructions for future reference.***

### ***Intended Use***

An attachment's purpose is to fasten threaded components together. It is used in limited clearance assembly applications to fasten threaded components a standard power tool (power source) would not reach.

An attachment must be calibrated before put into use. Information required for calibration is listed on the assembly drawing's title block. Power source calibration is to be performed by individuals deemed qualified by the manufacturer of the power source to program said equipment.

The ergonomic requirements of the facility and member state must be considered before putting an attachment and power source assembly into service. Items of primary concern include weight, torque, and height of work area in relationship to the operator.

### ***Hazards/Residual Risks***

The following circumstances can lead to operator injury and property damage:

- Do not use an attachment that has not been properly calibrated with its power source. The output of an uncalibrated offset is undeterminable.
- Do not exceed an attachment's maximum stated output torque. Maximum torque rating is found on the assembly drawing.
- Do not place foreign objects or body parts near an attachment's output.
- Gloves and other apparel may become entangled in an attachment's output.
- A high duty cycle increases heat generation and may cause burns when handled.
- Internal component failures cause heat generation. Do not touch an attachment that has begun to make grinding sounds or is behaving erratically.
- Torque reaction can cause pinch points and/or pin an operator between the attachment's power source and an object in the workstation.
- The interface (collar) between an attachment and its power source is only designed to remain seated during duty cycles in the direction of the output arrow on the assembly drawing, clockwise or counter clockwise. Running duty cycles in the direction opposite of the arrow shown near the output may unseat the attachment from the power source.
- Flying debris may result from a critical offset or assembly component failure.
- Safety glasses are required in the assembly workstation at all times.

### ***Foreseeable Misuses***

- An attachment is vulnerable to damage during calibration. Testing torque values should start low and gradually increase toward the application's target torque.
- Do not structurally modify an attachment. Attachment modification can cause reduced durability and operator injury.
- Do not add extensions to an attachment's input or output to extend its reach.
- Axial misalignment between an attachment's output and the fastener will damage an attachment, reduce its durability, and lessen torque repeatability. Attachments that do not fit an application due to mechanical size constraints should not be pressured to fit using force. Work access issues caused by an operators inability to comfortably reach an application, due to space or torque arm movement constraints, will cause similar issues.
- Efficiency shifts can happen over the lifespan of an attachment. To maintain torque repeatability an audit of an attachment's output must happen at end user determined intervals. Intervals need to be shorter than an acceptable rework period.
- Consideration of torque reaction should be taken into account when orientating start triggers with the attachment's output.
- Unapproved replacement parts reduce durability and torque repeatability.
- Mating gears and their accompanying bearings must be replaced in sets to avoid erratic torque repeatability and durability.
- An attachment is not intended to be used as a lever or hammer for moving or placing objects during assembly.
- An attachment's power source should not be used as a handle to loosen or tighten bolts, turning the offset into a simple uncontrolled wrench.
- Torque reaction bars added to an assembly near an attachment's output create undeterminable torque repeatability errors and reduced durability.
- Do not use the side of an attachment to provide torque reaction.
- Do not mount or clamp onto any area of an attachment that is not specifically referred to as a mounting area in the assembly drawing.
- Attachments conduct electricity. Special considerations must be taken into account to prevent electrocution when fastening components that are electrically charged.

### ***Safety Measures***

- Eye protection is required for any individuals in the workstation of an active attachment.
- An ergonomic review of the assembly station and assembly process must be carried out by the end user's Ergonomic personnel to ensure that the station, offset, power source, lift assist, torque reaction, accessibility, and general work area meets all member state and facility requirements.

### **Limited Warranty**

Jemms-Cascade Inc. products are warranted to be free of defect in material and craftsmanship for 1 (one) year or 250,000 fastening cycles from the date of shipment. The warranty of fitness only implies suitability of fastening applications in so far as the quoted attachment exceeds the application's requirements. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED.

The Jemms-Cascade's limited warranty expressly excludes the following items and conditions:

- Components considered wear items including, socket gears, socket adapters, sockets, screwdriver bits, bearings, bushings, springs, guarding material, reaction bars, pin or ball detent assemblies, and fasteners
- Damage caused to other components by failure of said wear items
- Incidental, consequential or special damages, or any other costs or expenses resulting from products supplied by Jemms-Cascade
- Components that have been misused, modified, improperly serviced, or a lack of preventative maintenance. (See Preventative Maintenance)
- Failures caused by the addition of output extensions
- Damage caused during calibration (See Foreseeable Calibration Misuses / Errors)

Further exclusions for custom designed gearboxes may be necessary and will be disclosed during the quotation period.

Repairs made by end users are not warranted due to the unknown condition of the assembly. Repairs made by Jemms-Cascade Inc. Service are covered under the above said Limited Warranty for a period of 1 (one) month or 10,000 cycles from the date of shipment.

All warranty claims will be assessed and completed at the organization's factory in Troy, Michigan. Supporting documentation and/or data may be requested in order to root cause a product problem. Jemms-Cascade must be given a reasonable amount of time to remedy a warranty claim and reserves the right to make design changes or modifications to existing product. Jemms-Cascade is not obligated to provide any additional spare assembly components as reparations for warranty work or production loss.

### **Foreseeable Calibration Misuses/Errors**

- Before attempting calibration verify the maximum output torque, gear ratio, efficiency, and direction of output rotation. This information is found on the part list drawing supplied by Jemms-Cascade. All of these values must be accounted for during calibration.
- If testing on a joint simulator, verify that the joint is loose using a manual wrench. Do not use the gearbox to loosen a test joint that has been tightened to an unknown torque.
- Individuals who are not deemed qualified by the power source's manufacturer should not test or validate a gearbox provided by Jemms-Cascade.
- An attachment is vulnerable to damage during calibration. Testing torque values should start low and gradually increase toward the application's target torque. Never allow an attachment to exceed its maximum output or input capacity with consideration to its gear ratio and efficiency.

### **Preventative Maintenance**

- Apply a compatible grease to the attachments grease fitting, using a grease gun, while the attachment is turning in free air every 3,000 fastening cycles. Sufficient grease has been provided at the first sight of lubrication appearing at the socket gear's hub.
- Compatible greases are Lithium based NGLI grade 2.
- Monitor the attachment for efficiency shifts or changes in capability. To maintain torque repeatability, an audit of a attachment's calibration must happen at end user determined intervals. Intervals must reasonably limit exposure to low torque failures and accompanying reworks. Efficiency shifts are a sign of a lack of lubrication or excessive wear and must not be corrected by increasing the input torque or the initial calibration value by more than 10%.
- Verify the screws holding the attachment together have not become loosened during operation after the first 3,000 fastening cycles. If screws are found to be loose, contact Jemms-Cascade for further instruction.
- Mating gears and their accompanying bearings must be replaced in sets to avoid erratic torque repeatability and durability loss. In the event of a component failure, all grease must be removed from the gearbox to avoid contaminates from damaging the new components. Lubricate the gearbox after maintenance.

**GENERAL TERMS**

- **Breakaway Torque:** The torque required to rotate a fastener in the direction of tightening.
- **Calibration:** Minimization of application torque variance between an assembly tool and an audit transducer's results through adjustment to the assembly tool.
- **Clamping Force:** The compressive force that a fastener exerts on a joint.
- **Gear Ratio:** The overall relationship in angular velocity between the input and output. It is written as Input Rotations : Output Rotations.
- **RPM:** Rotations per mixture. RPM is influenced by Gear Ratios other than 1:1.
- **Efficiency:** How effective an attachment is at transferring torque written as a percentage.
- **Pilot Diameter:** Machine element used to maintain concentricity.
- **Gear Hub:** Diameter on either end of a gear that is concentric to the pitch diameter.
- **Yield Strength:** Stress where a material will undergo permanent deformation.
- **Torque Audit:** Torque verification to an established baseline.

**Items to consider when providing data for Jemms**

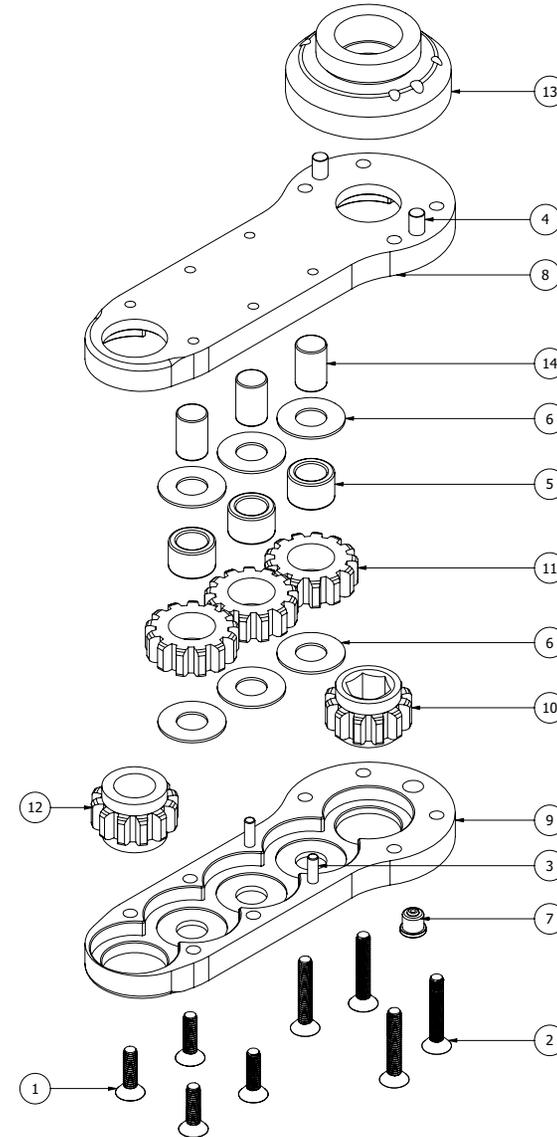
**Best fit – First time**

- Prevailing torque or duty cycle time
- Type of tool (Pulse, DC electric, clutch, etc.)
- Dimensional clearances
- Are STP files or drawings available
- Speed impact w/ heads with gear ratios
- Is your tool you want to use large enough with efficiency calculations?
- Performance/process requirements (Cm/Cmk, Cg/Cgk)

Based on your input we will match the correct composite for your job.

**What can affect lifecycle of your tool/application?**

- Lubrication
- Cycle count
- Misuse (side loading or crash conditions)
- Running at over dynamic limit of head
- Prevailing torque
- Type of tool (pulse, direct drive, etc.)
- Bad testing or calibration
- Loose parts (example inline tools need mating power tool to be tight and flush)
- Non PM of open end tools (contamination from external sources including dirt, oil, glove material, etc.)



ITEM	DESCRIPTION
14	IDLER SHAFT
13	COLLAR
12	SOCKET GEAR
11	IDLER GEAR
10	DRIVE GEAR
9	COVER PLATE
8	GEAR BOX
7	GREASE FITTING
6	THRUST WASHER
5	NEEDLE BEARING
4	DOWEL PIN
3	DOWEL
2	FHSCS
1	FHSCS

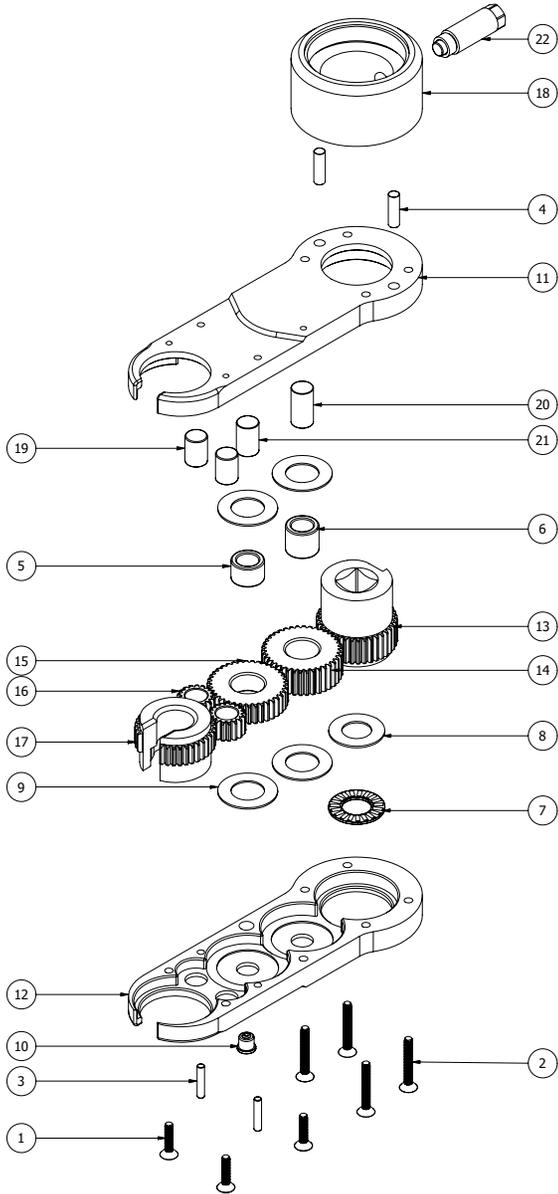
**JEMMS-CASCADE Inc.**

STOCK NUMBER: 5705  
 PRODUCT: OFFSET  
 MATERIAL: MASS: 0.357 lbmass  
 HARDEN TO: FINISH:  
 DRAWN BY: WGS SHEET 1 OF 1 C

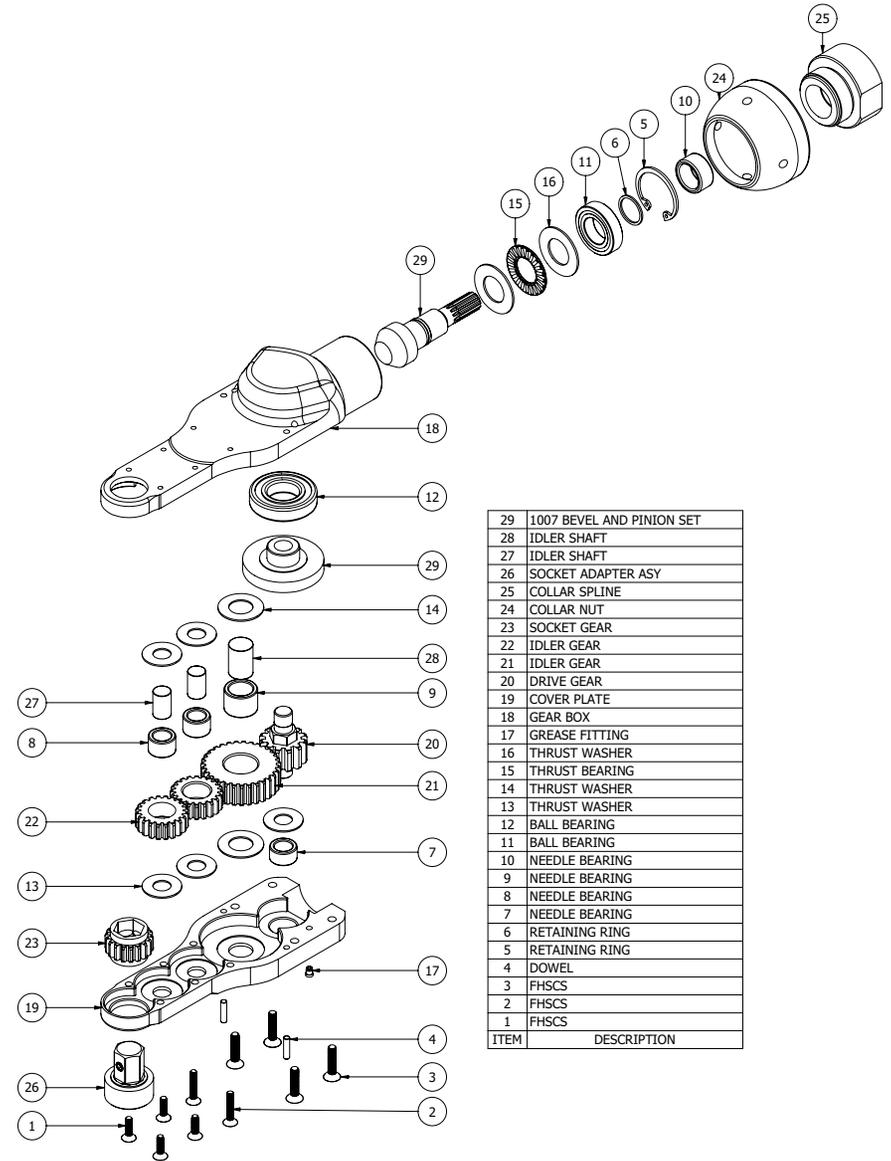
INTERPRET ALL DIMENSIONS AND TOLERANCES PER ANSI/ASME Y14.5-2009 ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

LINER: X ± .020 ANGLES: ± 50°  
 XX ± .010 FLATNESS: ± .005  
 XXX ± .005 ROUNDNESS: ± .010  
 XXXX ± .003  
 CORNER BREAK ~ .005/.010  
 FILLET RADIUS ~ .005/.015  
 DIMENSIONS ON A COMMON AXIS  
 CONCENTRICITY W/IN .003 TR

© 2018 JEMMS-CASCADE INC.  
 DRAWING NUMBER: 5705



22	STOP PIN ASSEMBLY
21	IDLER SHAFT
20	IDLER SHAFT
19	IDLER SHAFT
18	COLLAR
17	SOCKET GEAR
16	IDLER GEAR
15	IDLER GEAR
14	IDLER GEAR
13	DRIVE GEAR
12	COVER PLATE
11	GEAR BOX
10	GREASE FITTING
9	THRUST WASHER
8	THRUST WASHER
7	THRUST BEARING
6	NEEDLE BEARING
5	NEEDLE BEARING
4	DOWEL PIN
3	DOWEL
2	FHSCS
1	FHSCS
ITEM	DESCRIPTION



29	1007 BEVEL AND PINION SET
28	IDLER SHAFT
27	IDLER SHAFT
26	SOCKET ADAPTER ASY
25	COLLAR SPLINE
24	COLLAR NUT
23	SOCKET GEAR
22	IDLER GEAR
21	IDLER GEAR
20	DRIVE GEAR
19	COVER PLATE
18	GEAR BOX
17	GREASE FITTING
16	THRUST WASHER
15	THRUST BEARING
14	THRUST WASHER
13	THRUST WASHER
12	BALL BEARING
11	BALL BEARING
10	NEEDLE BEARING
9	NEEDLE BEARING
8	NEEDLE BEARING
7	NEEDLE BEARING
6	RETAINING RING
5	RETAINING RING
4	DOWEL
3	FHSCS
2	FHSCS
1	FHSCS
ITEM	DESCRIPTION

INTERPRET ALL DIMENSIONS AND TOLERANCES PER ANSI/ASME Y14.5-2018. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

**JEMMS-CASCADE Inc.**  
STOCK NUMBER: 5936  
PRODUCT: OPEN END - OFFSET

MATERIAL: MASS: 3.343 lbmass  
HARDEN TO: FINISH:  
DRAWN BY: JMT SHEET: 1 OF 1 C

DRAWING NUMBER: 5936-150

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INTERPRET ALL DIMENSIONS AND TOLERANCES PER ANSI/ASME Y14.5-2018. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

**JEMMS-CASCADE Inc.**  
STOCK NUMBER: 54082  
PRODUCT: CLOSED END - INLINE

MATERIAL: MASS: 3.986 lbmass  
HARDEN TO: FINISH:  
DRAWN BY: MWW SHEET: 1 OF 1 C

DRAWING NUMBER: 54082-150

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**Items to consider when providing data for Jemms**

**Best fit – First time**

- Prevailing torque or duty cycle time
- Type of tool (Pulse, DC electric, clutch, etc.)
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- Speed impact w/ heads with gear ratios
- Is your tool you want to use large enough with efficiency calculations?
- Performance/process requirements (Cm/Cmk, Cg/Cgk)

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- Misuse (side loading or crash conditions)
- Running at over dynamic limit of head
- Prevailing torque
- Type of tool (pulse, direct drive, etc.)
- Bad testing or calibration
- Loose parts (example inline tools need mating power tool to be tight and flush)
- Non PM of open end tools (contamination from external sources including dirt, oil, glove material, etc. )

**Mounting procedures**

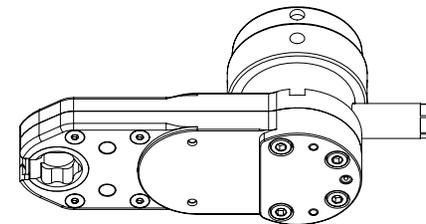
**Mounting Procedures, Spline Collar**

1. Secure threaded adapter onto power tool. (Tighten with spanner or adjustable wrench.)
2. Remove pin from square drive spindle.
3. Install geared Tube-Nut Attachment.
4. Thread on lock nut securely.
5. Remove retaining cap at square drive spindle while spindle is facing up. (There are loose ball bearings in the right angle head.)
6. Secure the threaded adapter (if design calls for one).
7. Engage the mating spline components at the desired position from the gun.
8. Secure the outer collar from the Attachment side to the threaded adapter on the motor.

**Specialty efficiency calculations**

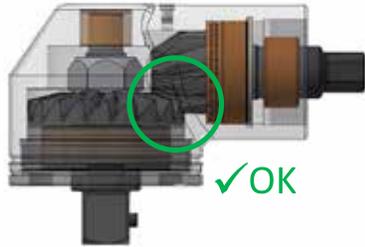
Each overall drawing has information related to configuring your power tool

1. Gear ratio
2. Efficiency
3. Max input/output torque
4. Output rotation
5. Output gear orientation
6. Each drawing will reflect rotational information

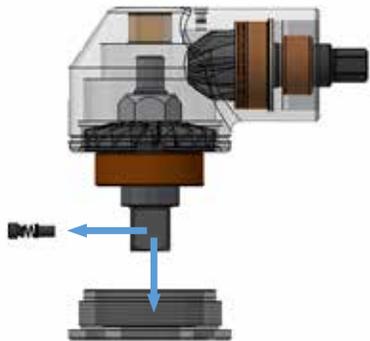


GEAR RATIO: 1:1	EFFICIENCY: 60%	APP TORQUE:
MAX INPUT TORQUE: 45 Nm		MAX OUTPUT TORQUE: 27 Nm
INPUT ROTATION: CW		OUTPUT ROTATION: CW
OUTPUT GEAR ORIENTATION: BOTTOM	POWER TOOL TORQUE = OUTPUT TORQUE / GEAR RATIO / EFF.	
OTHER:	RPM OF HEAD = POWER TOOL RPM / GEAR RATIO	
<small>INTERPRET ALL DIMENSIONS AND TOLERANCES PER ANSI/ASME Y14.5-2009 ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.</small>		
<b>JEMMS-CASCADE Inc.</b> STOCK NUMBER: 54665		DRAWING NUMBER: 54665 © 2017 JEMMS-CASCADE INC.
PRODUCT: OPENED END-OFFSET MATERIAL: MASS: 1.560 lbmass		
HARDEN TO: FINISH:		
DRAWN BY: DLS SHEET: 1 OF 1 B		
<small>LINEAR: .XX ± .020 ANGLES: ± 50°                  .XXX ± .010 FLATNESS: ± .005                  .XXXX ± .003 ROUNDNESS: ± .010                  .0000 ± .001                  CORNER BREAK ~ .005/.010                  FILLET RADI ~ .005/.015                  DIAMETERS ON A COMMON AXIS                  CONCENTRICITY W/IN .003 TIR</small>		

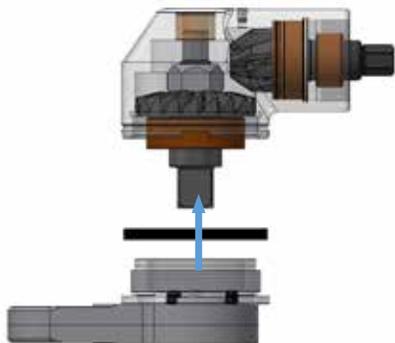
**Angle Head Collar Shimming**  
Maintaining Bevel and Pinion Mount Distance



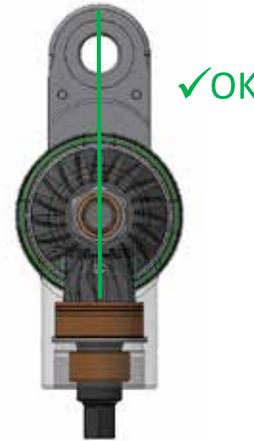
Proper Gear Mesh  
From Manufacturer



Remove End Cap  
and Pin Detent



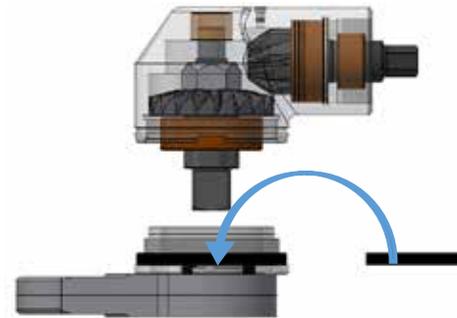
OD (Larger) Shims are used  
to Orientate the Attachment



Desired Attachment Orientation  
Tightened Beyond Input Torque  
Requirement to Input Torque  
Requirement +100%



OD Shims for Orientation  
Created Improper Gear  
Mesh Condition



Correct Gear Mesh by Adding  
Equal Thickness of ID (Smaller)  
Shims Under Bevel Gear



ID Shims Have Corrected  
Gear Mesh

**Troubleshooting**

Symptom	Possible Cause	Corrective Action
Increased Efficiency Loss  (Low Torque Audit)	Lack of lubrication	Increase lubrication frequency and review preventative maintenance documentation.
	Bearing failure	Clean and degrease all components, replace bearings, lubricate, and review the preventative maintenance documentation.
	Exceeded service life	Review limited warranty documentation, time since purchase, and fastening cycles. Order replacement assembly and contact local distributor or JEMMS about usage, expected life cycles, and typical lead times to eliminate future downtime.
Increase in Torque Scatter  (Increase in Torque Standard Deviation or Decrease in a Machine Capability Index)	Lack of lubrication	Increase lubrication frequency and review preventative maintenance documentation.
	Bearing failure	Clean and degrease all components, replace bearings, lubricate, and review the preventative maintenance documentation.
	Exceeded service life	Review limited warranty documentation. Order replacement assembly and contact local distributor or JEMMS about usage, expected life cycles, and typical lead times to eliminate future downtime.
Gearbox Fracture	Gearbox is used as a reaction device	Unless quoted and designed to do so, using a gearbox as a reaction device is not acceptable.
	The assembly environment is prohibiting alignment between the gearbox's output and the fastener	Stop using the attachment on the problem fasteners and contact JEMMS to evaluate the space constraint and new design options.
	Use of output extensions, adapters, or extended socket gears	Reduce or eliminate the number of extension joints or overall extension length through assembly process reorganization.
	Internal component failure	The gearbox will not withstand forces generated during operation with debris created from internal component failure.
	Exceeded service life	A fatigue failure is the ultimate outcome of all limited clearance fastening applications. Review limited warranty documentation, time since purchase, and fastening cycles. Order replacement assembly and contact local distributor or JEMMS about usage, expected life cycles, and typical lead times to eliminate future downtime.
Socket Gear Fracture	Misalignment or less than full socket engagement with the fastener	Evaluate the possible use of socket extensions, multiple socket adapters, additional attachments, assembly steps reorganization, or attachment redesign.
	Exceeded service life	Socket gears are considered wear items and are excluded from JEMMS limited warranty.

Symptom	Possible Cause	Corrective Action
Output Will Not Turn	Internal damage	Remove attachment from power tool. If it doesn't turn freely by hand a service inspection is required to determine extent of the damage.
Tubenut Attachment Will Not Home	Programming error	The tubenut homes by operating the tool in reverse with a 5Nm target.
	Stop pin damage	Remove and replace stop assembly and inspect stop or drive gear sweep for damage. Verify that the reverse parameter is stopping the power tool at 5Nm.
Hold Bit Fracture	Product feature geometry causes frequent bit changes	The hold feature, torque, and in turn bit durability is controlled by the product being assembled. JEMMS can only design attachment internals to be more durable than the hold of the product to ensure that the bit is the consumable item. Although JEMMS engineering may be able to create incremental changes in durability, substantial changes can only occur with the product company.
Loose Hold Bit	Joint vibration loosens the set screw retaining the hold bit	Consider a bit modification, groove or drill point, if frequent or unacceptable amount of set screw loosening is occurring. Retighten set screw.
Gearbox Screws are Loose or Missing	Power tool is creating higher than normal vibration	Apply Loctite 242 to all gearbox fasteners, replace missing fasteners, and retighten.
Collar bolts or threads are loose	Joint vibration has loosened the collar threads or bolts	Retighten and closely monitor collar threads or bolts over the next 1,000 cycles. Loose collar components can damage an attachment through internal sidelading and cause head separation with unexpected movements or rotation.
	Running fastening cycles in the direction opposite of intended (loosening with a hand tool)	Routine usage in the opposite direction from design intent requires a special collar. Contact JEMMS with requirements for recommendations.
Socket is Stuck on the Fastener	Fastener geometry is not industry standard, is made of a soft material, or has had surface treatments that increase drive geometry	Contact JEMMS about designing and manufacturing custom socket geometry.
	Fixture binding	Minimize deflection between attachment outputs as well as between outputs and the product being fastened. Utilize a programmed socket relaxation strategy. Create fixture compliance after cycle complete. (Example: Apply brakes at cycle start, release at cycle complete)



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