

# CG&S Basic Gear Department inspection & Testing Procedures

**Purpose:** To clearly define quality inspection procedures to the gear department customer service personnel.

**Scope:** To assure the customer of quality parts in a timely manner. With any new job a quality plan will be written & presented to the customer. This plan will be strictly adhered to throughout the production process. The following are general procedures to be used in a more detailed quality plan tailored to the customer's part / drawing & purchase order requirements.

## **SPUR GEARS**

Measure over pins  
Tooth to Tooth error  
T.I.R.(Total indicated run out)  
Total Composite (Tooth-Tooth and T.I.R. combined)  
Center Distance (For required backlash (.003-.005))

## **SPROCKETS**

Measure over pins  
Circular pitch test via sample chain wrap  
Run out (Pin in teeth)

## **HELICALS**

Measure over pins and measure whole depth via depth micrometer  
Check lead via Fellows lead tester  
Run at center distance with mating part.  
Check Backlash (.003-.005 standard)  
Run tight check for tooth bearing use Dykem paste. Dykem should appear on pitch line approximate  $\frac{3}{4}$  of the length of part.  
Run out 15 degree 20 degree angle us pin in part on bench centers (45 degree can not be checked this way)  
Run out for 45 degree use Brown and Sharp with spring loaded device, using pin in teeth.

All can be check on the B & S; use a bushing on stationary end, place pin between teeth and spin against bushing and check T.I.R.

## **INTERNAL SPURS**

Measure over pins with internal micrometer on and off machine.  
Measure with one pin and outside diameter.  
Run out use #2 and measure in several places.

Make a go to no go gauge for jobs over 50 pcs.

The go gauge make to the standard wire size the no go make .002 over standard. This will give you the back lash needed.

### **BEVELS AND MITERS**

Set tooth vernial to check addendum and circular tooth thickness.

Check depth with depth gauge or use topping hob with same pitch and pressure angle.

Check radial & axial run out via pin between teeth in the horizontal plain.

Check tooth bearing with Dykem paste. Dykem should appear on pitch line approximately  $\frac{3}{4}$  of the face length (straight bevel gear).

Conniflex tooth form should bear in middle of tooth only (104 Gleason).

5) Check for toe, heel and cross bearing, adjust tools accordingly.

6) Back lash run at required mounting distance (.003-.005) standard.

### **WORMS**

Measure over pin, two pin method for two and four starts, three pin method for one start.

Height gauge method use three pins no matter what the start is.

Run out, use optical comparator put pin in bore, lay pin in v-blocks, bring line to root of tooth and rotate.

Whole depth use same method as #2.

Center distance run with mate (.003-.005) standard.

Tooth bearing run with mate use Dykem. Dykem to show along pitch line, 80% bearing.

Check lead.

Set tooth vernias to check addendum and circular tooth thickness.

### **WORM GEARS**

Measure over balls ( if available).

Measure throat diameter with vernias (throat diameter is what a standard spur gear should be.) (ex: 10 D.P. 20 teeth throat diameter is 2.200)

Back lash run with mate (.003-.005) standard.

Bearing roll test with mate, (Ref #5 under worms).

### **RATCHETS**

Run out use pin in teeth.

Tooth profile check angle on optical comparator.

Flat on top of tooth check on optical comparator for appropriate width ( if called for).

Make sure tooth is cut on center or off center in relation to bore (if called for).

### **RACKS**

Measure over pin in several locations.

Check circular pitch with hob, tooth templates gauges or measure C.P. on optical comparator.

Straightness after gear cutting (re-straightening).

## **SPLINES**

Straight sided measure root diameter and tooth thickness.  
Run out; use a drop indicator onto root of each tooth space for t.i.r..  
Fit check with gauge or mate according to class.

## **INVOLUTE SPLINES**

Measure over pins.  
Run out check with pin.  
Fit check with gauges or at least a mate according to class.

All quality procedures will default to A.G.M.A. Q8 unless otherwise specified on the customer drawing or p/o. then tooth element tolerances may have to be proven such as lead, profile & spacing.

**Say what you do & do what you say!**