TOOLS & PRODUCTION

GEAR BACKLASH

FACTORS AFFECTING PUNCH LIFE:

- Having a good quality, punchable, converting material
- Having well lubricated, unworn gears
- Having sharp dies
- Having good punch replacement procedures
- Having good punch unit handling procedures
- Having good punch unit storage procedures
- **Having zero gear backlash**

GEAR BACKLASH
Biggest reason for poor punch life.

- Gear backlash may be present but may not be easily detected.
- Gear backlash is often misunderstood
- 90% of punching problems are caused by gear backlash
- **Gear backlash must be ZERO**

CAUSES OF GEAR BACKLASH

- Normal gear wear
- Rough handling or mis-handling during shipment of the punch unit
- Severe web wrap-ups around the punch rings or punch cylinder
- Hard press stops or excessive E-Stops
- Lack of gear lubrication
- Debris in the gear teeth

CAUSES OF GEAR BACKLASH CON'T

- Harsh and fast acceleration rates
- Harsh and fast deceleration rates

GEAR BACKLASH MUST BE ZERO!

SEVERE GEAR BACKLASH

- Backlash can be seen and is obvious
- Backlash can be heard when rotating the gears by hand
- Front to back wear on punches will be obvious; a round punch will take on an oval shape
- Punched holes will hang significantly in the web direction

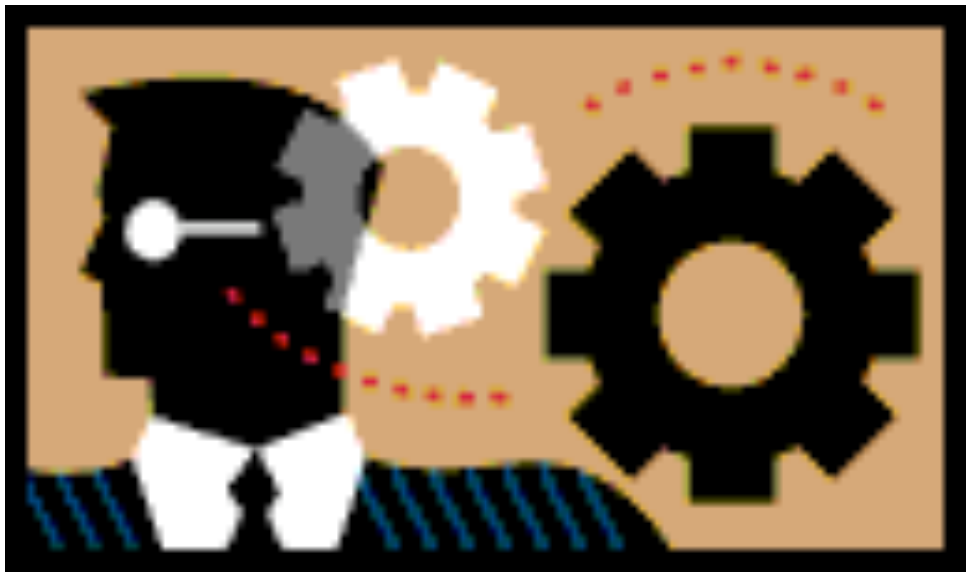
SUBTLE GEAR BACKLASH

- Subtle gear backlash will cause the same problems as severe gear backlash but on a smaller scale.
- If the converting material is a difficult material to punch even a very small amount of gear backlash will cause problems.

WHEN TO SUSPECT BACKLASH?

- When several punched holes begin to hang
- When replacing a punch does not help to reduce hanging chad

THE PUNCH & DIE GEARS



PREP FOR BACKLASH REMOVAL

- Remove the punch unit from the press
- Remove all punches from the punch unit
- Determine your method of removing backlash
- Become familiar with your backlash removal method
- Look and feel for backlash in the gears

  -Can you see the gear backlash?

  -Do the gears rotate too freely?
- Rotate the punch unit by hand and note the rotational resistance (the resistance will become greater with the backlash effectively removed)

PREP FOR BACKLASH REMOVAL CON'T

- Clean the gear teeth
- Inspect the gears for wear or broken teeth
- Replace worn or damaged gears
- Loosen the gear's backlash bolts and verify that the split gear halves move freely.

ALWAYS ROTATE THE PUNCH UNIT IN ITS NATURAL DIRECTION OF ROTATION!

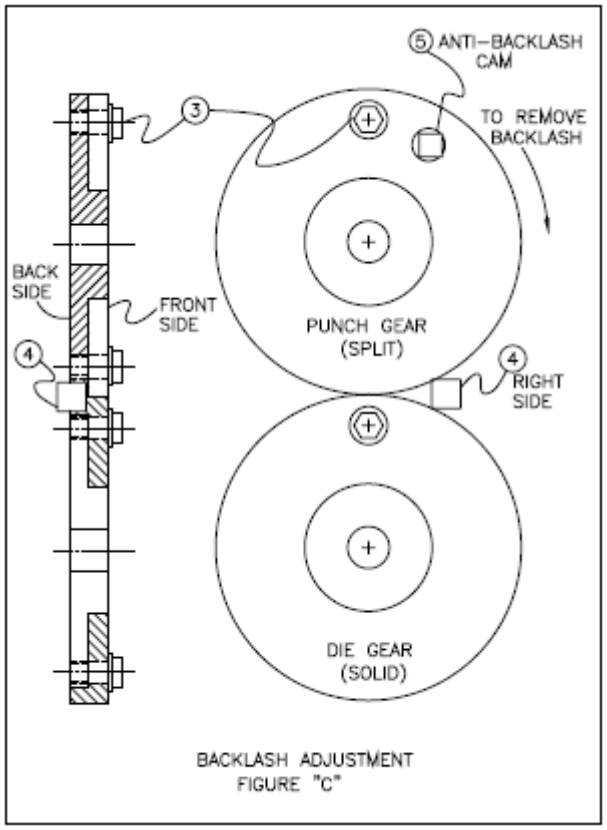
BACKLASH REMOVAL METHODS

1. Backlash adjustment with cam

- OR

2. Backlash adjustment with no cam.

1. BACKLASH ADJUSTMENT WITH CAM

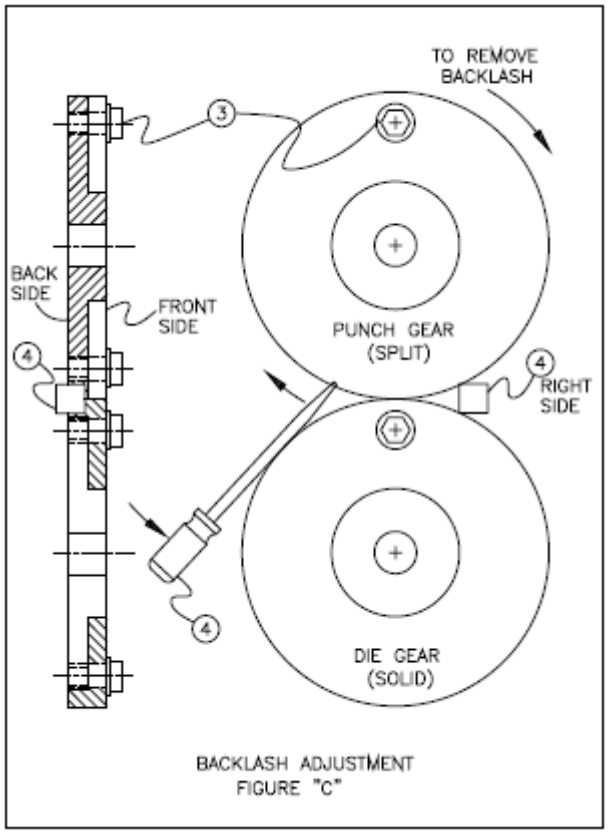


BACKLASH ADJUSTMENT
FIGURE "C"

TO REMOVE BACKLASH, COMPLETE THE FOLLOWING:

1. Loosen all hex bolts on the punch gear face.
2. Block that half of the punch gear which is closest to the frame on the right side.
3. Rotate the backlash cam clockwise using a 3/8” wrench; 70 to 75 lb.in. is all that is required to effectively remove backlash
4. Tighten all hex bolts while applying clockwise pressure on the backlash cam.

2. BACKLASH ADJUSTMENT NO CAM



BACKLASH ADJUSTMENT
FIGURE "C"

- **TO REMOVE BACKLASH, COMPLETE THE FOLLOWING:**
- 1. Loosen all hex bolts on the punch gear face.
- 2. Block that half of the punch gear which is closest to the frame on the right side.
- 3. Insert a heavy screwdriver into the front half of the punch gear on the left side. Then, while using the die gear as a fulcrum, push down on the screwdriver to turn the front half of the gear in a clockwise direction.
- 4. While applying downward pressure on the screwdriver, tighten all hex bolts.

AFTER REMOVING BACKLASH

- Rotate the punch unit around by hand and note the difference in the resistance to rotation; the resistance should be greater than before, but should not bind.
- It may be necessary to remove the backlash 2 or 3 times until satisfied with the rotational resistance.
- Replace and shear in only one punch at a time.

CAUTION

Be careful when removing gear backlash to not exert excessive pressure on the gear teeth!

EXCESSIVE PRESSURE COULD CAUSE:

*Gear teeth to break

*Premature gear wear

*Excessive gear noise