ROTARY CUTTING DIE ASSESSMENT

ROTOCON

Standard Operating Procedure

The rotary cutting die is a highly sensitive and precision engineered piece of equipment. In order for this tool to operate efficiently and produce high quality die cutting results, it is essential that it is correctly maintained and kept in pristine working condition. In order to promote the efficiency and extend the longevity of the rotary cutting die. It is very important that it is regularly assessed to detect any wear & tear defects that may negatively impact on the final die cutting results and to ensure that the die is timeously repaired / reconditioned and thus ensure that the die is 100% press ready at all times. This assesment must be carried out after each use of the die.

Equipment Needed

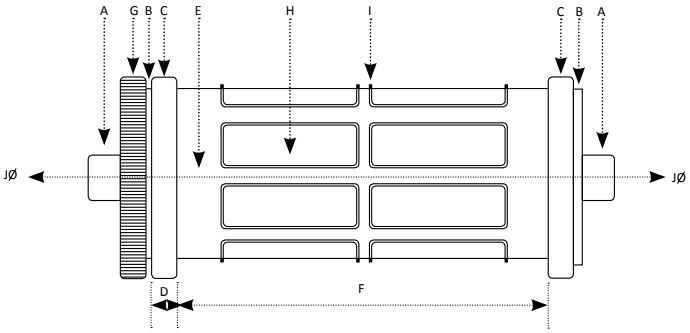
This equipment should be kept & maintained by the Tooling Controller and can be used for all in-house assessments of rotary dies, support rollers and print cylinders.

- Micrometres (0.01 mm grad.) - Magifying glass (5 X magnification)
- Digital verneers (0.01 mm grad.) - Set of hex Allen keys (metric)
- A 50cm Steel ruler (1mm grad.) - Rotary Die testing station
- Printers cleaning solvent - D.W.F. aerosol lubricating oil.

The Assessment

Before doing an assessment, place the die in a bench top stand and use a soft cloth & some printers solvent to clean all the components of the tool thoroughly (including the gear). Now you are ready to proceed with the assessment of the rotary tool.

ROTARY CUTTING DIE COMPONENTS



A JOURNAL (SHAFT). **B** COLLAR. **C** BEARER. **D** BEARER WIDTH.
E DIE BODY. **F** DIE BODY WIDTH. **G** DIE GEAR. **H** LABEL CAVITY.
I CUTTING EDGE. **J** REVOLVING CENTRE

Visually check the full circumference of the gear (G) to see that none of its teeth are unevenly worn, chipped or damaged.
Using the digital verneer, measure the outside diameter of the gear and compare this with the specified diameter for the number of teeth on your Die Gear Chart. These two measurements should either match or the actual should be no less than 2/100ths below or above the specified O.D. for that gear size.
Now check both journals (A) for wear caused by the die blocks. The journals may be bent due to excessive die pressure.
Place the die between centres (J) and use a "machine clock" to check for any run-out which is an indication that the Journals are bent.
NOTE: the run-out must be no greater than 2/100 th's of a mm.
Next is the Bearer (C) of the die. BE ALERT & ACCURATE. Visual check the full circumference of each bearer, looking for gear marks (feint, evenly spaced horizontal lines with the same pattern as the die gear), flat spots, flaking and uneven wear and tear.
Using the Micrometre, accurately measure the O.D. of each bearer. Check this measurement against the "Specified Pitch" diameter for the specific gear size of the die.
NOTE: Both bearers must be exactly the same size and the actual bearer size must be no more than 2.5/10th's below P.D. for 1/8 C.P. gears and 1.5/10ths for D.P. Gears.
Using a magnifying glass, carry out a careful visual inspection of the cutting edge (I) of each cavity (H) of the die, checking for nicks, flat spots and any indication that the cutting edge is blunt or damaged.
Using a black khoki pen, make a circle around the "suspect area" of the cutting edge. This will assist you to easily pick out the defective areas during the grinding and reconditioning process.
Now compare the defects on the die with customers die pull sample and the "recon" instructions.

At this point you should place the cutting die in yhe "test station" and do a die pull / test strip using the specified test material. Now place the test strip on a flat bench top and slowly strip the waste Matrix off at a 45 degree stripping angle.
Now you can remove labels off the liner / backing to match the repeat of the die and do a Malachite test to check the depth and quality of the die cut.
The assessment is now completed and based on your findings and you are now in a position to make a decision about what future action, if any, needs to be taken with this cutting die.

What does your assessment reveal about the cutting die?

Problem	Possible Cause / Solution
1. Gear teeth are chipped or broken / stripped.	1. Die gear is "bottoming" in anvil gear and breaking during the forced engaging / disengaging action of the gears. gear is undersized. **Solution:** Make a new gear to match the O.D. of the die bearer. **Recommended:** Check the anvil gear & ensure that the damage hasn't transferred.
2. Jornals are bent. Die is running out.	2. This is generally due to excessive die pressure being applied causing the Die Blocks to be worn & pushing the die forward. **Solution:** Place between centres. Grind & follow full re-conditioning process.
3. Squashed and damaged die bearer.	3. This is usually due to excessive die pressure when the die is blunt & is an attempt to force the die to cut deeper. **Solution:** Place between centres. Grind & even out the bearers & follow the full reconditioning process.
4. Bearers are unevenly worn.	4. This is a normal wear & tear process. **Solution:** Do a full assessment & follow full re-conditioning process.
5. Cutting edge is Blunt.	5. Generally caused when the cutting die bounces in the die station due to insufficient pressure being applied to lock the die into the station. **Solution:** Do a full assesment & follow full re-conditioning process.
6. Micro nicks on top of cutting edge.	6. This is a symptom of "Faulty" gears on one or more of the rollers in the die station (die, anvil or support roller). **Solution:** Do a full assessment of these rollers, their gears & the bearings / bushes in these mounting blocks.
7. Gear Marks on the die bearers.	7. Check that gear Marks have not transferred to the other rollers. repair or replace or re-condition faulty components.
Readings from the Test piece / die pull	
8. Fluffy paper edges on the sides of the label.	8. The die is cutting too light & the cutting edge is going blunt.
9. Adhesive strings on the edge of the die cut label.	9. The cutting edge is not sharp enough for the die to cut through the adhesive.
10. Labels lifting & tearing matrix.	10. Die is blunt / wrong undercut.
11. Cutting too deep into the backing paper.	11. Wrong under cut for the specified liner or the die bearers are worn.
12. Cutting intermittently into the silicon layer.	12. The cutting edge is unevenly worn / sharpened.
13. Cutting through the backing.	13. Cutting edge is Blunt? Bearers are worn? Check undercut.