

Progressive Die Design and Engineering Process Documentation

Prepared by: Joe Littell, Tool and Die Design Engineer

1. Part Print Evaluation:

- Receive and review customer part print or CAD model
- Identify critical dimensions, tolerances, radii, material type, and part features
- Determine forming, coining, bending, blanking, or drawing operations needed

2. Flat Blank Development:

- Develop a flat blank layout using CAD or unfolding software
- Account for material thickness, bend allowances, grain direction, and spring back
- Validate flat pattern dimensions for accuracy and functionality

3. Strip Layout Design:

- Determine material width and pitch based on part shape and feed direction
- Arrange stations for piercing, forming, bending, and cutoff in logical order
- Include carrier design to maintain part integrity during progression

4. Tool Concept and Die Base Selection:

- Choose die set style: in-die sensors, center-guided, heel-guided, or straight-sided
- Assign upper/lower die sections and sub-assemblies
- Define type of press required (tonnage, shut height, stroke)

5. Detail Die Design:

- Create complete 3D CAD assembly of the die
- Design individual components: punches, dies, strippers, lifters, cams, etc.
- Apply standard clearances and punch-to-die relationships
- Incorporate safety blocks, part ejection, sensors, and tool steel grades

6. Generate Detail Prints and Bill of Materials (BOM):

- Produce 2D manufacturing prints for all components with material specs and tolerances
- Create BOM listing all materials, tool steels, purchased components (springs, fasteners, cams, bushings)
- Specify heat treatment and surface finishes (e.g. nitriding, coating)

7. Procurement and Scheduling:

- Submit BOM to purchasing for material and standard component orders
- Reserve shop floor slot for die build based on timeline
- Order any custom or specialty components (e.g. wire EDM inserts, nitrided cams)

8. Tool Build and Assembly:

- Deliver materials and prints to toolroom
- Machining and fabrication of components (CNC, grinding, wire EDM)
- Assemble the die on die set, checking alignment, fits, and fasteners

9. Press Tryout and Debug:

- Run die in tryout press with sample coil stock
- Verify part dimensions, burrs, clearances, and feeding
- Troubleshoot forming issues, strip alignment, and sensor performance

10. Engineering Changes and Finalization:

- Apply any required engineering changes based on tryout
- Rework or regrind tooling components if needed
- Document revisions and update CAD/drawing files

11. Ready for Production:

- Certify final die setup and performance in production press
- Store die with setup sheet, inspection results, and die history log
- Notify production team and quality department for production release

End of Process Documentation