

***APPLIED PRECISION TECHNOLOGY, INC.***  
***AND***  
***LIBERTY PLASTICS COMPANY, INC.***

***TECHNICAL DATA BULLETIN***

**GRADE: Drilling Close Center Lines, AT8000™**

**DATE: March 17, 1999**

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AT8000™ is not difficult to drill, but when very close centers are required,

AT8000™ does drill differently. Better, we think but different. Because our tests indicate that drilling .050 centers is different in technique than drilling .075 and .100 centers, we limit our discussion to just .050 centers and ask that you use your present methods for all other sizes:

Drilling machines have different capabilities and we don't know the specific limitations of your equipment. We will try to make universal statements and provide you with a formula that will allow you to adapt to your specific situation.

**GLOSSARY OF TERMS**

1. Drill run out - The ability of a particular drill to enter the material perfectly perpendicular to the surface
2. Spotting - Drilling into the material slightly with a spotting or center drill before beginning the drilling sequence
3. Chip Load - The length of penetration per single revolution of a drill
4. Spindle speed (rpm) - The speed at which the drill rotates
5. Feed speed (ipm) - The speed at which the drill travels through the material being drilled
6. Peck - The length of drill travel before it is lifted up beyond the surface to relieve its load

## TECHNIQUE

1. Determine the "Surface Feet per Minute (S.F.P.M.)" using the following formula:

$$\text{S.F.P.M.} = \frac{\text{r.p.m.} \times 3.14 \times \text{Dia.}}{12}$$

2. Determine the "Revolutions per Minute (r.p.m.)" using the following formula"

$$\text{R.P.M.} = \frac{\text{S.F.P.M.} \times 12}{3.13 \times \text{Dia.}}$$

3. Determine the "Chip Load" using the following formula"

$$\text{CHIP LOAD} = \frac{\text{I.P.M.}}{\text{R.P.M.}}$$

4. Determine the "Inches per Minute, Feed (I.P.M.)" using the following formula:

$$\text{I.P.M.} = \text{R.P.M.} \times \text{chip load}$$

5. Determine the peck rate - 1 x Diameter of the drill used.

6. Determine the number of pecks by dividing the thickness by the peck rate, Round downward.

7. Spray dry air or vacuum at drill.

8. Center drill or spot drill to at least 80% of the finished drill diameter (.030).

9. We recommend the use of circuit board style drills for all glass/epoxy material including AT8000™

10. Check drill chuck or collets for run out and if possible adjust to compensate for individual variables.

## WHAT WE RECOMMEND

Use the aforementioned technique as a start, this will probably give you the best results. Adjust to maximize productivity.

## WHAT WE DID

When we were asked to test for drilling using .560 material, we drilled a 400 hole pattern, .050 centers (.037" drill") in one square inch. Our r.p.m. was set at 5,000. Our feed was 8.0 i.p.m. We center drilled and pecked at .050 (1 x diameter). We were able to drill 300 holes per hour with very little deflection.

We use and recommend "Metal Removals 255 straight shank circuit board drills." They are designed to produce accurate and smooth holes in epoxy phenolics, non-ferrous alloys, plastics, aluminums and other highly abrasive materials. BR>

## DEVIATION

In our experience, a run out of .001" per .100" of the thickness of the material is to be expected.

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The Drilling Close Center Lines, AT8000™ Technical Data Bulletin  
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