PILOT Precision Products

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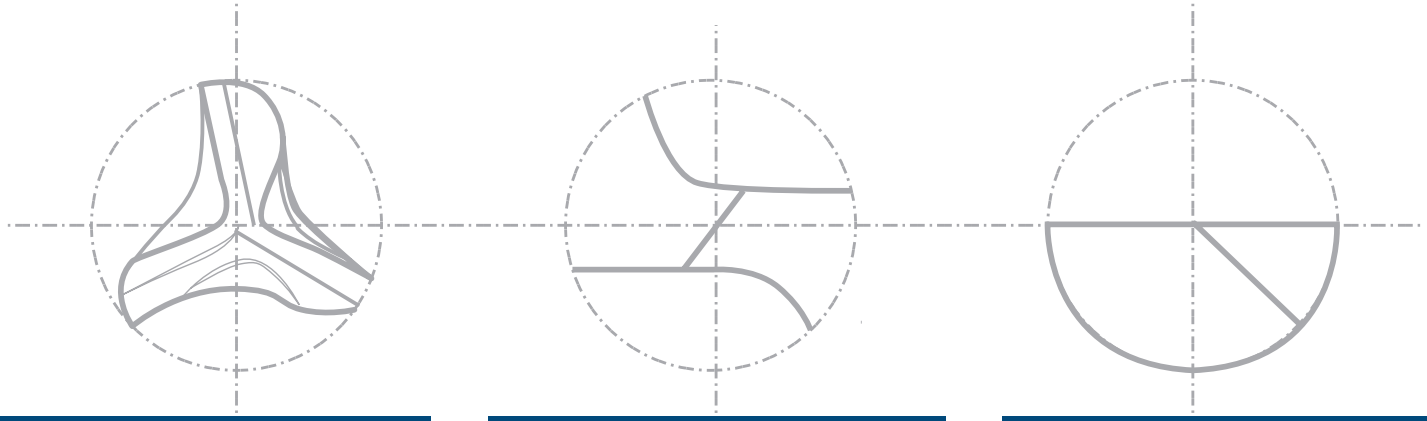
POINT GEOMETRY OF DRILL - GENERAL RECOMMENDATIONS

The purpose of this document is to highlight main differences of **point geometry** between the 3 types of carbide series (**3-flute series, 2-flute series, half-round series**).

These distinctions will help you make the best choice for your drilling applications.

This document must not be considered as the "absolute truth," but as a guide to help discussion during engineering. Be aware that drill's geometry has other important criteria such as flute angle, for example.

POINT GEOMETRY OF MAIN CARBIDE DRILLS SERIES



3 FLUTES

3100-3200 SERIES

140° POINT
6 FACETS
WEB THINNING

2 FLUTES

6140-6120-6100 SERIES

120° POINT
4 FACETS

6200HP-6220HP SERIES

140° POINT
WEB THINNING

1 FLUTE

1100 SERIES

120° POINT
1 FACET

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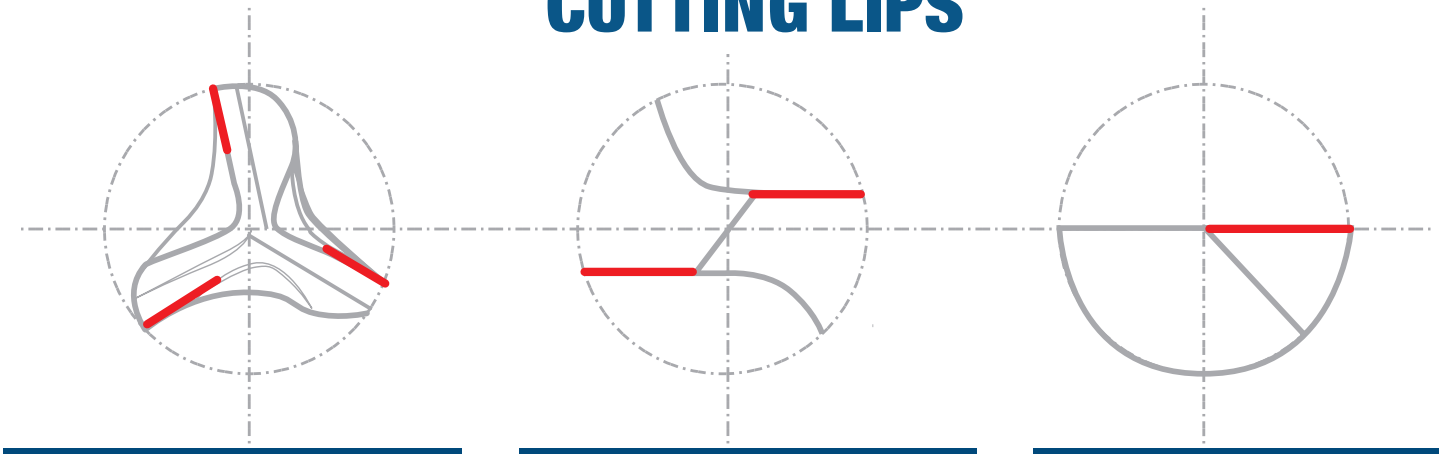
CUTTING LIPS



3 SHORT LIPS

Heat of cutting is absorbed by 3 short lips so perfect for high-tense materials.

3 lips make thiner chips. Good for less burrs outside hole.

2 LONG LIPS

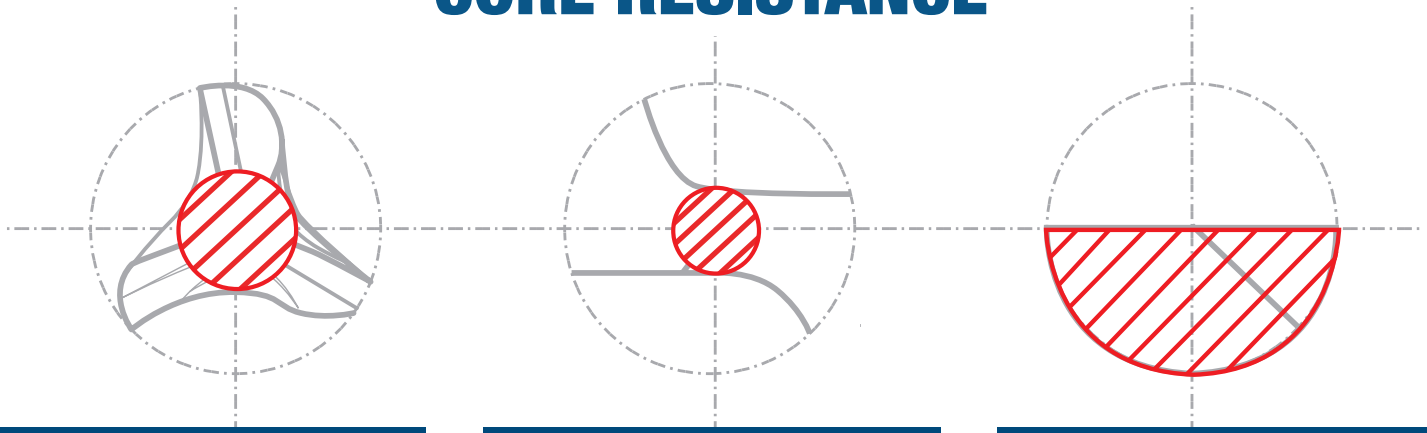
Length of lips are longer for the 120° point standard series than the 140° point HP series.

2 long lips absorb heat of cutting so appropriate for many applications.

1 LONG LIP

The single lip starts from hole center so perfect cutting for soft material applications.

CORE RESISTANCE



30% DIAM CORE

Strong core circa 30%D makes drill resistant to transversal forces. It is good for no deviation.

Good for direct drilling with no centering.

20-25% DIAM CORE

Core 20%D for standard series
Core 25%D for HP series

It makes drills appropriate for a wide range of applications

HALF SIZE CORE

Core is 50%D but drill can be weak under transversal forces with flexion while drilling.

Drill does not turn so good for coolant flow.

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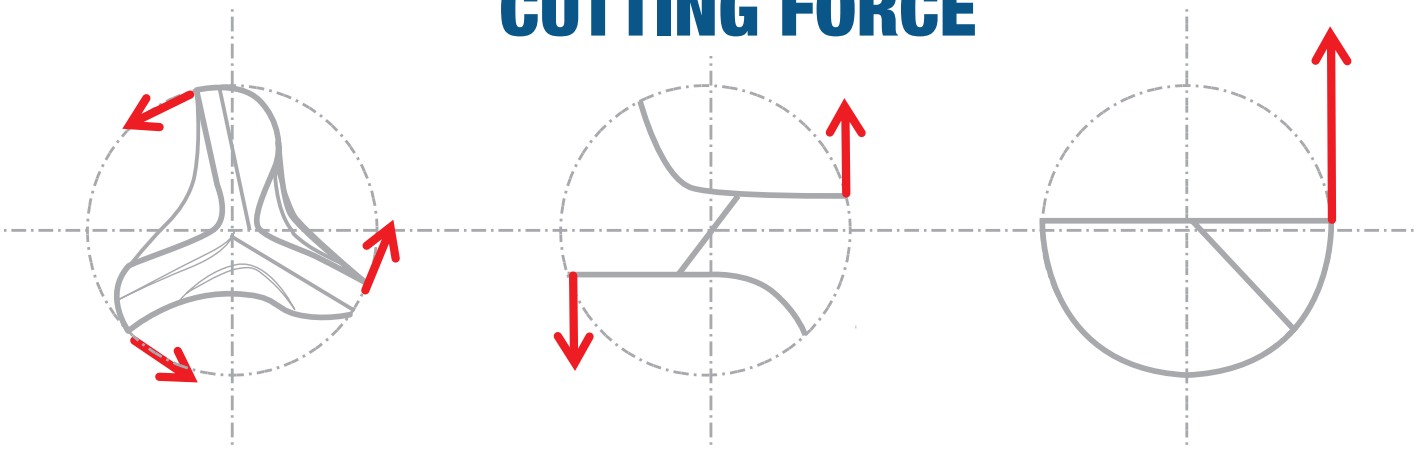
CUTTING FORCE



33% FORCE PER LIP

Cutting forces are well-balanced on the 3 lips.

It gives opportunity to speed up feeds and rates in some applications.

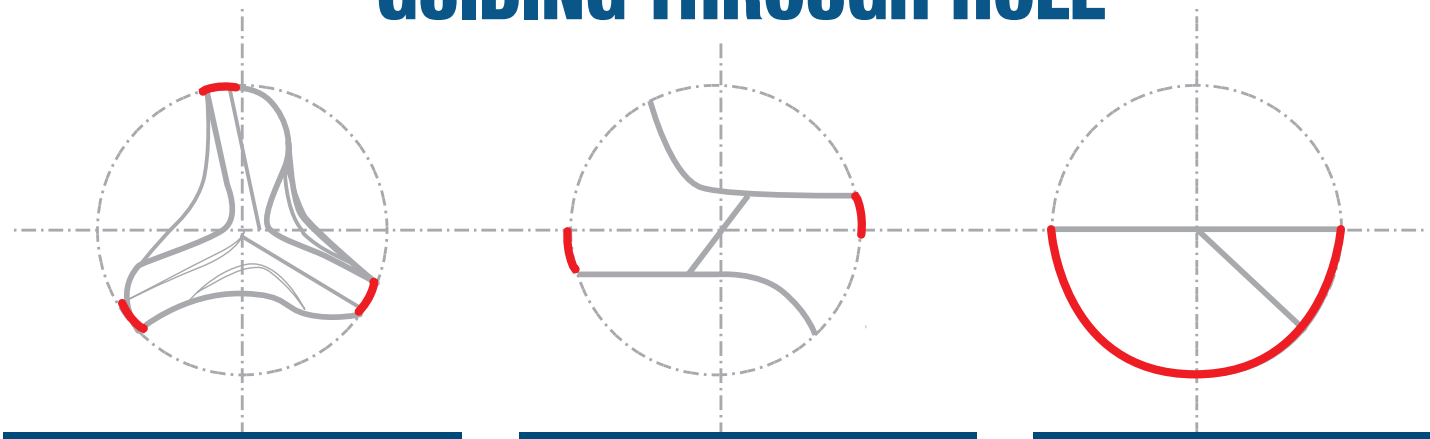
50% FORCE PER LIP

Each lip makes the job.

100% FORCE PER LIP

All cutting force is on one lip. This is why single flute geometry is not appropriate for tough materials applications but only for soft material.

GUIDING THROUGH HOLE



3 MARGINS

Drill is guided by 3 margins which make the drilling through hole straight.

Circularity of hole is perfect with no ovalization.

2 MARGINS

Good drilling guiding with the 2 margins.

In certain conditions, drill can have vibrations and be a cause of poor hole quality. For deep holes, may require a pilot pre-drill or a pecking cycle process.

HALF ROUND

Half round guiding is perfect as drill does not turn.

In soft materials, gun drills are used direct with no pre-drill or centering.

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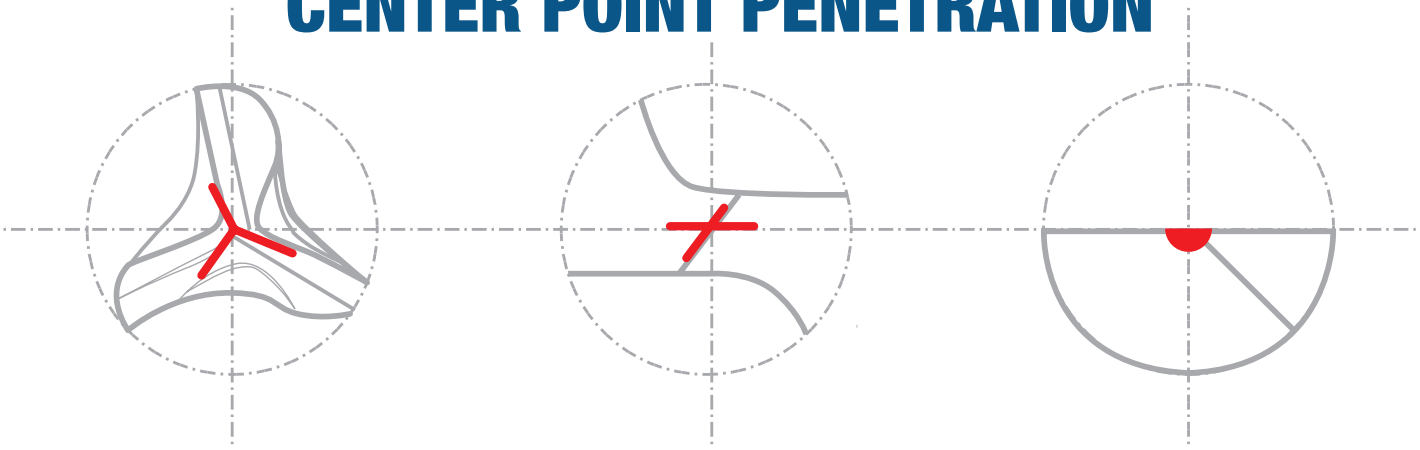
CENTER POINT PENETRATION



3 CROSS EDGES

The pointed center with 3 edges makes a good penetration in material.

2 EDGES

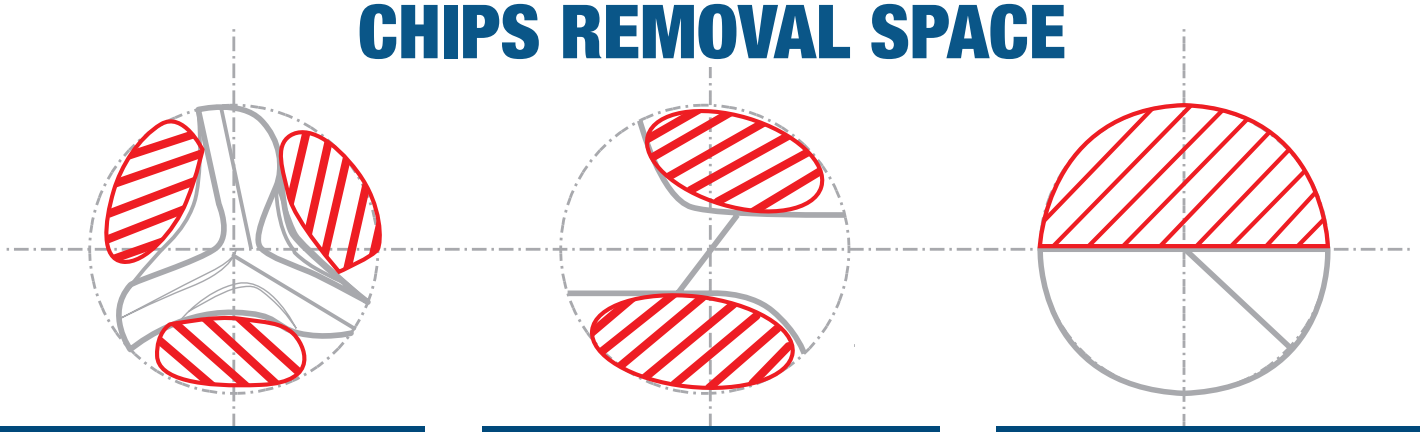
The 2 chisel edges is best geometry for 2- flute drills.

The addition of a web thinning makes penetration easier.

SMALL CONE POINT

Center is a sharp pointed cone where starts cutting lip.

CHIPS REMOVAL SPACE



3 SPACES

3 tubes for removal of chips give good conditions to avoid blockages while drilling.

2 WIDE SPACES

The 2 spaces for removal are appropriate for main drilling applications.

In some cases, chips remain blocked and require a pecking cycle process.

HALF ROUND SPACE

Chips evacuation is optimum. The room is wide to let chips slide back along flute length.

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