# Drilling tips and techniques for different materials

How to correctly apply the tool is an important part to reach successful end results.

In this listicle we present “Drilling tips and techniques for different materials” presenting recommendation on actions to resolve common issues that may occur when drilling specifically within the different materials.

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## Drilling low carbon steel tips

**ISSUE:** Chip formation can be a difficult issue with low carbon steels, which often are used for welded components. The lower the hardness, carbon and sulphur content of the steel, the longer the chips are that will be produced.

**RECOMMENDATIONS:** If problems with chip formation occur, increase the speed, $v_c$, and decrease the feed, $f_n$ (note in normal steels, the feed should be increased).

**OTHER:** Use high pressure and internal coolant supply.

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## Drilling austenitic and duplex stainless steel tips

**ISSUE:** Austenitic, duplex, and super duplex materials can cause problems with chip formation and evacuation.

**RECOMMENDATIONS:** The correct geometry is crucial as it enables chips to form properly and aids their evacuation. In general terms, a sharp cutting edge is preferable. If problems with chip formation occur, increasing the feed, $f_n$ will allow the chips to break more easily.

**OTHER:** Internal coolant, high pressure.

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## Drilling CGI (Compact Graphite Iron) tips

**ISSUE:** CGI does not normally require extra attention. It produces larger chips than grey cast iron, but they are well broken. Cutting forces are higher, which affects tool life. Extra wear resistant grades are necessary. Corner wear is typical as in all cast irons.

**RECOMMENDATIONS:** If problems with chip formation occur, increase the speed, $v_c$, and decrease the feed, $f_n$.

**OTHER:** Internal coolant.

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## Drilling aluminium alloy tips

**ISSUE:** Burr formation and chip evacuation can be a problem. Poor tool life can also be present due to adhesion.

**RECOMMENDATIONS:** For best chip formation, use low feed and high speed.

In order to avoid poor tool life it may be necessary to test different coatings, minimizing adhesion. These coatings could include diamond coatings or certain cases (depending on the substrate) not using any coating at all.

**OTHER:** Use emulsion or mist coolant at high pressure.

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## Drilling titanium and Heat Resistant Alloy tips

**ISSUE:** Work hardening of hole surface affects subsequent operations. Good chip evacuation can be difficult to obtain.

**RECOMMENDATIONS:** When selecting a geometry for titanium alloys it is preferable to have a sharp cutting edge. For Nickle-based alloys, having a robust geometry is crucial. If work hardening is an issue, attempt to increase feed rate.

**OTHER:** High pressure (up to 70 bar) coolant improves performance.

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## Drilling hard steel tips

**ISSUE:** Obtaining an acceptable tool life.

**RECOMMENDATIONS:** Lower cutting speed in order to reduce heat. Adjust feed rate in order to obtain acceptable chips that can be easily evacuated.

**OTHER:** Emulsion with a high mixture.