



Technical Data

10/1/2016

CUTTING OILS

Introduction

Ipsa Texchem Pvt. Ltd.'s Cutting Oils are specially formulated to provide maximum performance over a wide range of metal removing operations. Ipsa's Cutting Oils are available in two distinct families, namely:

- **Soluble Cutting Oils**

Metsol and Metsol HD

- **Neat Cutting Oils**

Cuticut and Cuticut Plus

Metsol and Metsol HD Soluble Cutting Oils are used where rapid heat removal is the main criteria. When diluted with water, they produce stable emulsions which have excellent cooling ability and the necessary balance of lubricity and extreme pressure characteristics required for proper machining conditions.

Cuticut and Cuticut Plus Neat Cutting Oils are designed for use as they are received and are non-miscible in water. They have excellent lubricity and anti-wear characteristics, assist in extending tool life and produce a quality finish on machined parts.

Primary Functions of a Cutting Oil

The main functions of a cutting oil are to lubricate or reduce the friction between the cutting tool and the workpiece and act as a coolant by rapidly removing the heat generated at the tool and workpiece interface.

Lubricating Properties

To perform satisfactorily as a lubricant, a cutting oil must greatly reduce friction at or near the tool tip, where the highest temperatures occur and between the moving tip

and the rake face of the cutting tool. Special additives are often included in the formulation to provide the needed lubricity under severe boundary lubrication conditions:

For moderate pressures and temperatures, up to approximately 150°C, fatty oils when blended into mineral oils make good boundary lubricants.

For extreme pressures and temperatures, additives such as chlorine and/or sulphur are surface reactive and form metallic reaction product films on the tool surface, thereby acting much like a solid lubricant at the metal-tool surface.

- **Proper lubrication reduces friction, thus:**

- Less coolant is required to absorb the heat, since there is less friction to be dissipated
- Less cutting energy is required, which results in lower power consumption and/or higher production rates.
- Less cutting tool wear
- Improved surface finishes

Cooling Properties

A coolant's main function is to remove heat from the cutting tool, chip and workpiece. To perform the cooling function properly in a given operation, the viscosity of a finished cutting oil should be low enough to clear the chips and not insulate the heat from the operation, but high enough to control oil misting.

As water has the highest thermal conductivity, water-soluble oils and synthetics are the best coolants for grinding

Value through performance

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operations involving high rates of metal removal. At the other end of the scale, high viscosity mineral oils have low thermal conductivity and are most suited to slow-speed cutting operations involving high contact pressures.

Cooling is also related to flowrate. Thus by increasing the flowrate of a cutting oil over the tool/workpiece area, the cooling action of the oil can be improved.

Anti-Wear Properties

Extreme temperatures and pressures at the cutting interface may cause the metal to weld to the tool face. Effective anti-wear characteristics may be imparted to cutting oils by incorporating appropriate additives.

The most common additives are chlorinated, or sulfurized additives that are active or inactive. These materials react chemically with metals, under the temperatures and pressures encountered at the chip/tool interface, to form a surface film of low shear-strength thus creating higher lubricity.

Features and Benefits

Soluble Oils

• Outstanding emulsifying properties

- Forms fine, highly stable emulsions even in hard water
- Resists oil separation
- Long oil service life

• Low foaming tendency

- Eliminates formation of undesirable foams
- Facilitates easy settling of swarf

• High lubricity

- Improves surface finish
- Extends tool life
- Lowers power consumption and/or increases production rates

• Superior resistance to rust and corrosion

- Delivers excellent protection to both tools and workpieces against rust and corrosion

Neat Cutting Oils

• Low viscosity

- Accelerates heat removal from tool and workpiece
- Facilitates rapid settling of chips and swarf
- Improves clarity of re-circulated oil
- Prevents excessive wear at contact surfaces

• Contain friction reducing compounds

- Prevents welding and “built-up edge” on cutting tools
- Reduces friction and heat between tool and workpiece
- Lowers power consumption
- Improves surface finish

• Light in colour

- Permits easy viewing of the workpiece

Value through performance



Applications

Soluble Oils

Ipsa's Soluble Oils are used where rapid heat removal is the major requirement. Ipsa's Soluble Oils are blended from mineral oils, emulsifiers, rust inhibitors, extreme pressure additives and other coupling agents. The products are mixed with water in normal starting proportions of 3% to 10% for most operations.

Ipsa's Soluble Oils produce highly stable emulsions, which have excellent cooling ability and the necessary lubricity and extreme pressure characteristics for proper machining.

Metsolis specially designed for general machining operations. Applications include cutting, drilling, milling and grinding, where a general purpose coolant is required. Metsol™ is recommended for all machining operations, where cooling and rust protection are of prime importance. The product contains a biocide (anti-microbial agent).

Metsol HD a heavy duty oil which contains extreme pressure additives for use in metal removal operations, where a high degree of surface finish and long tool life are desired.

Metsol HD is intended for difficult machining operations. The product provides good rust protection and contains a biocide (anti-microbial agent).

Neat Cutting Oils

Ipsa's Neat Cutting Oils are either mixtures of ultra pure HT Hydrocracked base oils, or blends of these base oils with varying amounts of extreme pressure additives, such as sulphur and chlorine and/or lubricity agents. They are designed to meet specific applications.

Ipsa's Neat Cutting Oils have excellent lubricity and anti-wear characteristics, and assist in extending tool life and produce a quality finish on machined parts.

Cuticut Oils are non-staining, transparent cutting oils intended for high-speed automatic screw machining and simple turning.

They are primarily recommended for machining low carbon steels and non-ferrous metals such as copper, aluminium and magnesium.

Cuticut Plus Oils are designed for use in heavy duty cutting and grinding operations on high strength ferrous alloys and tough-to-machine nickel/cobalt alloys. These operations include: tapping, threading, broaching and conventional turning.

- Cuticut Plus 13 is a low viscosity oil, specially suited for use in thread cutting and deep-hole drilling.