ALUMINUM METAL MACHINING FLUID LUBRICATING CONCENTRATE

Inventor: C. Matthias Gigel, Augsburg (DE)

Correspondence Address:
LARSON AND LARSON
11199 9TH STREET NORTH
LARGO, FL 33773

Assignee: STEVEN E. RAYFIELD.

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ABSTRACT

A concentrate particularly suitable for aluminum machining containing: alkenylsuccinic acid derivative, sodium hydroxide salt; ether carboxylate; alkyl benzene sodium sulfate; fatty alcohol polyglycol ether; tall oil fatty acid having about 18 carbon atoms; trimethyl propylene; butylcarbitol; (44%) potassium hydroxide; and blended with about 50% by weight of a mineral oil and added to water to form a working composition.
ALUMINUM METAL MACHINING FLUID LUBRICATING CONCENTRATE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to lubricant fluids used in metal machining. More particularly, it refers to a fluid lubricant concentrate for use in the machining of aluminum products.

[0003] 2. Description of the Prior Art

[0004] U.S. Pat. No. 5,668,093 describes the use of alkenylsuccinic acid half-amides used in metal working liquids. In addition, the preparation of alkenylsuccinic anhydride used as a starting material to make the alkenylsuccinic acid half-amides are well known. Although the alkenylsuccinic acid half-amides are now known generally as metal working liquids, each type of metal requires specific concentrates for optimum results. A major problem of prior art cutting fluids is that they alter the substrate surface chemistry of aluminum substrates. They also have poor water break characteristics resulting in incomplete coating of the substrate by the cutting fluid and the retention of contaminants on the substrate surface following cleaning, including water beads.

[0005] Aluminum, a soft metal requires greater lubrication during machining operations than steel, cast iron and other ferrous metal alloys. In addition, the lubricant needs to be non-hazardous, free from foaming, blendable with mineral oil, have a compatible pH above 8.0, and not stain or discolor the aluminum.

SUMMARY OF THE INVENTION

[0006] The present invention provides a solution to the prior art need by providing a machining lubricant for aluminum products that is not hazardous, environmentally friendly, free from foaming, blendable with mineral oil, having a compatible pH above 8.0, boron and amine free and will not corrode, stain or discolor aluminum. The machining lubricant of this invention is a clear emulsion which turns opal when diluted with water. The ingredients are:

[0007] alkenylsuccinic half-amide derivative, sodium hydroxide salt;
[0008] ether carboxylate;
[0009] alkylbenzene sodium sulfate;
[0010] fatty alcohol polyglycol ether;
[0011] tall oil fatty acid;
[0012] trimethyl propylene;
[0013] butylcarbitol; and
[0014] potassium hydroxide;

all blendable with mineral oil.

[0015] The concentrate is mixed with water prior to use in an aluminum machining operation.

DETAILED DESCRIPTION OF THE INVENTION

[0016] The concentrate of this invention is useful for various applications in the metal working of aluminum. These applications include heavy machining cutting, stamping, drilling, forming and ban saw cutting. The active ingredients are blendable with mineral oil to form the concentrate. The working composition contains less than 5% by weight of the concentrate in tap water. This composition removes chips instantly from a threading operation from the threading tool and the resulting threaded product without affecting the diameter of the product. The composition is boron free and will not corrode, stain or discolor aluminum. The active ingredients form a clear emulsion when blended with mineral oil, but turns opal in color when blended with water.

[0017] The concentrate contains the following eight active ingredients in specific weight percents totaling 100, which are blended with about 50% by weight mineral oil:

[0018] 18-25 alkenylsuccinic acid derivative, sodium hydroxide salt (commercially known as HOSEFACOR 3928, and containing about twenty-eight carbon atoms);
[0019] 3-7 ether carboxylate;
[0020] 12-16 alkyl benzene sodium sulfate;
[0021] 15-18 fatty alcohol polyglycol ether;
[0022] 6-12 tall oil fatty acid having about 18 carbon atoms;
[0023] 8-15 trimethyl propylene;
[0024] 4-7 butylcarbitol; and
[0025] 12-16 potassium hydroxide (44% concentration).

[0026] A bactericide can be added to increase pot life.

[0027] A preferred concentrate contains the following active ingredients at a weight percent of about:

[0028] 22 alkenylsuccinic acid derivative, sodium hydroxide salt (HOSEFACOR 3928);
[0029] 3 ether carboxylate;
[0030] 14 alkyl benzene sodium sulfate;
[0031] 18 fatty alcohol polyglycol ether;
[0032] 10 tall oil fatty acid having about 18 carbon atoms;
[0033] 13 trimethyl propylene;
[0034] 6 butyl carbitol; and
[0035] 14 potassium hydroxide (44% concentration).

[0036] The above active ingredients are blended with 50% by weight of any conventional mineral oil. Especially, those having a naphthenate or paraffin base can be blended with the active ingredients to form a clear liquid concentrate. Further blending with water is employed in most machining operations using less than 5% by weight of concentrate in tap water.

[0037] Known cutting fluids do not suggest the use of the unique combination of materials in the cutting fluids of the present invention which achieve outstanding performance results when used in machining aluminum.
The following percent by weight of concentrate is mixed with tap water to form the working compositions in the indicated operations:

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>% BY WEIGHT CONCENTRATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinding</td>
<td>2.5 to 3.5</td>
</tr>
<tr>
<td>Cutting</td>
<td>3.0</td>
</tr>
<tr>
<td>Drilling</td>
<td>3.0</td>
</tr>
<tr>
<td>Tapping</td>
<td>4.0 to 5.0</td>
</tr>
<tr>
<td>CNC</td>
<td>3.0 to 4.0</td>
</tr>
</tbody>
</table>

Equivalent ingredients can be substituted for the above enumerated ingredients to create a substantially equivalent functional concentrate, in substantially the same way and with substantially the same results.

Having thus described the invention, what is claimed for

Letters Patent follows:

1. An aluminum machining lubricating fluid concentrate comprising about 50% by weight of a mineral oil blended with 100% by weight of the following:
   - 18-25 alkenylsuccinic acid derivative, sodium hydroxide salt;
   - 3-7 ether carboxylate;
   - 12-16 alkyl benzene sodium sulfate;
   - 15-18 fatty alcohol polyglycol ether;
   - 6-12 tall oil fatty acid having about 18 carbon atoms;
   - 8-15 trimethyl propylene;
   - 4-7 butylcarbitol; and
   - 12-16 potassium hydroxide (44% concentration).

2. The aluminum machining lubricating fluid concentrate according to claim 1, blended with water to form a metal working composition.

3. An aluminum machining lubricating fluid composition according to claim 2, containing a bactericide and defoaming agent.

4. An aluminum machining lubricating fluid concentrate consisting by weight percent of:
   - 18-25 a salt of an alkenylsuccinic acid derivative, sodium hydroxide salt;
   - 3-7 ether carboxylate;
   - 12-16 alkyl benzene sodium sulfate;
   - 15-18 fatty alcohol polyglycol ether;
   - 6-12 tall oil fatty acid having about 18 carbon atoms;
   - 8-15 trimethyl propylene;
   - 4-7 butylcarbitol;
   - 12-16 potassium hydroxide (44% concentration); and
   - blended with about 50% by weight of a mineral oil.

5. An aluminum machining lubricating fluid concentrate consisting by weight percent about:
   - 22 a sodium hydroxide salt of an alkenylsuccinic acid derivative;
   - 3 ether carboxylate;
   - 14 alkyl benzene sodium sulfate;
   - 18 fatty alcohol polyglycol ether;
   - 10 tall oil fatty acid having about 18 carbon atoms;
   - 13 trimethyl propylene;
   - 6 butylcarbitol;
   - 14 potassium hydroxide (44% concentration); and
   - blended with about 50% by weight of a mineral oil.

6. The aluminum machining lubricating fluid concentrate according to claim 5, blended at less than 5% by weight of concentrate in water to form a working composition.

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