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LUBRICATING AND COOLING FLUID FOR COLD  
AND HOT ROLLING OF METALS

M. M. Gorenshtein, et al

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Wright-Patterson Air Force Base, Ohio

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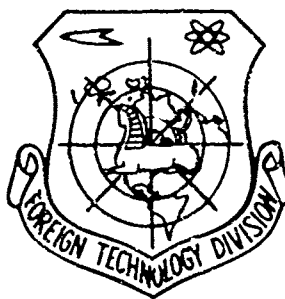
# FOREIGN TECHNOLOGY DIVISION



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ROLLING OF METALS

by

M. M. Gorenshteyn, S. Ye. Kondrashin, et al.



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By: M. M. Gorenshteyn, S. Ye. Kondrashin, et al.

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WP-AFB, OHIO.

## LUBRICATING AND COOLING FLUID FOR COLD AND HOT ROLLING OF METALS

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The invention relates to the field of cold and hot rolling of metallic strip and may be mainly applied in rolling of hard-to-work precision alloys, auto sheet, and sheet iron, which are faced with elevated requirements in terms of surface quality.

Existing lubricating and cooling fluids (LCF) for cold and hot rolling of metals are based on water and salts of amines and fatty acids.

In order to increase LCF effectiveness it is proposed that the following be added to its composition: oxyethylated monoethanol amides of synthetic fatty acids, esters of high-molecular synthetic fatty alcohols, and a corrosion inhibitor.

Composition of the LCF, wt. %: sintamid-5, 0.5-0.7; EHMSFA, 0.5-0.7; corrosion inhibitor, 0.5-0.7; remainder, deionized water.

Sintamid-5 is made up of oxyethylated monoethanol amides of synthetic fatty acids of the fraction  $C_{10}-C_{16}$ .

The EHMSFA are esters (waxes) of high-molecular synthetic fatty alcohols in which the number of carbon atoms is greater than  $C_{17}$ . They should satisfy the following requirements: acid number 16.1 mg KOH/g, saponification number 99.7 mg KOH, ester number 83.6 mg KOH/g, and drop temperature  $56^{\circ}\text{C}$ .

The proposed three-component aqueous emulsion (SEV) is made as follows.

A 10% concentrate is prepared in a separate vessel. All components are simultaneously introduced into a tank with the appropriate amount of water and are melted by steam, with simultaneous agitation.

The concentrate temperature should fall within the limits  $70-80^{\circ}\text{C}$ .

The 10% concentrate of the emulsion is introduced into the main vessel, containing water heated to  $40-50^{\circ}\text{C}$ , until the required working concentration is obtained.

As the lubricating and cooling fluid is used water and emulsion concentrate are added.

When the proposed aqueous emulsion SEV is used the emulsion retains its effectiveness when the strip to be rolled is heated to  $500^{\circ}\text{C}$ ; this makes it possible to carry out hot rolling of steel and imposes virtually no limitation on the rate of cold rolling.

At the temperature at which the steel is annealed, the emulsion components are decomposed into volatiles and do not leave any traces of "tarnish" on the surface of the strip.

When the SEV emulsion is used the energy and power parameters of rolling are reduced by 25-30%, making it possible to increase

reduction and to lower the number of passes and the number of intermediate annealings.

The film of SEV emulsion retained on the surface of the strip after annealing will protect the metal from corrosion.

The SEV emulsion has no objectionable odor; it is not toxic and is absolutely safe with respect to fire, as well as remaining stable during prolonged use. The service life of the emulsion is up to two weeks when water and emulsion concentrate are added as the lubricating and cooling fluid is consumed.

After use the emulsion is easily decomposed chemically; this makes it possible to pour the water remaining after treatment with chemical agents into storage vessels without danger of contaminating them.

#### Object of the Invention

1. The lubricating and cooling fluid for cold and hot rolling of metals, based on deionized water, *is distinguished* by the fact that in order to increase fluid effectiveness oxyethylated monoethanol amides of synthetic fatty acids, esters of high-molecular synthetic fatty alcohols, and a corrosion inhibitor are added to its composition.

2. The lubricating and cooling fluid in p. 1 *is distinguished* by the fact that the following are introduced into it (in wt. %): oxyethylated monoethanol amides of synthetic fatty acids, 0.5-0.7; corrosion inhibitor, 0.5-0.7; deionized water, to 100.