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THE EFFECT OF SPEED ON FOURDRINIER WIRE WEAR

by

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SUMMARY OF RESULTS

A series of tests was carried out to determine the effect of speed on wire wear.

Both wet and dry tests were run on a rotating disc faced with No. 600 silicon carbide paper.

Under the conditions of the dry test, wire wear increased approximately linearly with speed, while in the wet test, wire wear reached a minimum at 1760 feet per minute and increased at both higher and lower speeds.

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INTRODUCTION

In a letter dated April 8, 1958, Mr. J. G. Buchanan, Physicist, Pulp and Paper Research Institute of Canada, Montreal, P.Q., requested an investigation of fourdrinier wire wear as a function of speed. Two samples of worn fourdrinier wire cloth accompanied the letter.

The letter asserted that, statistically, a wire, passing over a flat-box cover at the same friction force and grit conditions, will be worn more at high speed than at low speed.

Mr. Buchanan suggested two approaches that might clarify the problem: first, to study the wear-speed relationship at constant friction force, grit, and abrading distance, but varying speed, on a wear apparatus designed at the Mines Branch; second, to examine the two samples of wire, removed from machines having the same drag load and grit but different speeds, and to look for any apparent differences due to speed.

MICROSCOPIC EXAMINATION OF THE WORN WIRE CLOTH SAMPLES

The worn knuckles of the wire cloth samples exhibited distinct grooving, but comparison of the two samples indicated no apparent differences in either the depth or width of the grooves, nor were there any other structural differences in the two samples which could be attributed to the wearing conditions.

ABRASION OF WIRE CLOTH SAMPLES AT VARIOUS SPEEDS

A series of tests was carried out to determine the effect of speed on wire wear. In the tests, samples of unused fourdrinier wire cloth, under constant normal force, were abraded against a rotating disc faced with No. 600 silicon carbide paper. Both wet and dry tests were run.

The wet tests were lubricated with water.

A series of five different circumferential speeds was achieved by driving the turn table at 880 rpm and 1760 rpm and by varying the radii at which the samples contacted the disc. The running time at any radius and motor speed was calculated so that the abrading distance for each sample was identical. Running time varied from 2 to 6.5 minutes.

In an attempt to extend the abrading time per sample to several hours, "micro-cut" abrasive paper, providing a mild but positive cutting action, was used. However, it was found that the various test speeds altered the surface characteristics of the paper, introducing a further variable. Thus, No. 600 silicon carbide paper and a short running time were adopted.

Wire wear was measured as percent weight loss of the sample. The results are plotted graphically in Figure 1.

DISCUSSION

Under the conditions of the dry test, wire wear increased approximately linearly with speed (see Figure 1). The minimum wear at 1760 fpm in the wet runs indicates that the wear mechanism is probably influenced by the planing action of the specimen on the water film. (This planing action apparently approaches optimum conditions at 1760 fpm in this experiment).

A relationship between wire wear and speed is indicated by this work. However, it is evident that the results may not be directly applicable to give wire wear at different speeds on the paper machine, where the normal loading and grit conditions are somewhat different than those which could be used in the experiment.

Other frictional studies have shown that wear is approximately linear with speed up to certain speeds, after which the wear rate rises sharply with increasing speed. It would appear that under the conditions of the experiment the samples were still in the linear portion of the wear-speed relationship, although statistical studies have suggested that fourdrinier wire wear begins to rise sharply as machine speeds exceed 2000 fpm.

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FIGURE 1