FOREST ENGINEERING RESEARCH INSTITUTE OF CANADA
Western Division

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FIELD NOTE NO.: Roads & Bridges--9
Previous Note Reference Nos.: None

SUBJECT: RB90 READ SCREEN-ALL VIBRATING SCREEN

Eve River Woodlands Division of MacMillan Bloedel Ltd. experimented with a mobile vibrating screen to determine whether coarse, native material could be economically upgraded for road surfacing and ballasting. Finning Tractor and Equipment Ltd. imported the machine from California to evaluate its marketability in B.C. Screening trials took place during October and early November 1985, during adverse weather conditions.

WORKING PRINCIPAL: The Screen-All has a large sloping deck covered with two, 2 m x 1.48 m, metal screens. The screens are removable and are available with square hole sizes ranging from 13 to 65 mm. The deck is supported by coil springs which allow limited, multidirectional movement. A single shaft, bolted to the deck's underside, has an off-balance flywheel at either end and is directly driven by a hydraulic motor. Power is supplied by a three-cylinder, air-cooled, Lister diesel engine which develops 44 hp at 2100 rpm. Estimated price is $100 000 f.o.b. Vancouver, B.C.

A front-end loader places material directly onto the screens. The deck is vibrated at 1100-1200 rpm, causing the oversize particles to migrate down the screens and fall into a pile behind the machine. Material passing through the screens also falls to the ground but at the front opening of the machine. Flywheel rotation can be reversed to shake particles up or down the sloping screens, thereby controlling the time material remains on the screens. The quality and speed of screening is dependent upon the material type, the screen hole size, and the direction of shaking.

The machine has a fifth-wheel towing arrangement. A set of dual wheels at one end can be hydraulically raised or lowered for travelling. A wire rope strap, attached to the tow reach, facilitates moving the Screen-All with the front-end loader.

STUDY SITES: The screening operation was studied in two developed gravel pits. A screen with 65-mm holes was used at the first pit and one with 32-mm holes was used at the second pit. At both locations, a Caterpillar 966C front-end loader was used to excavate, load the screen, and stockpile. The same loader also loaded gravel trucks from both the screen and the stockpiles.

Material at site #1 consisted of sticky, subangular fluvial deposits. The material was poorly graded cobbles, with a high percentage volume of fines and organic materials. Heavy rain and snow hampered screen production by cementing the fine materials together. Production was greatest when the direction of rotation shook material down the screen slope.

Material at Site #2 was well-graded cobbles, with some pockets of overburden. The material contained both rounded and angular particles. Production was greatest when the direction of rotation shook material up the screen slope.

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Approximately 16% of screened volume consisted of oversized material greater than 9 cm in size.

PRODUCTIVITY AND PRODUCTION COST: The owning and operating cost of the Screen-All was estimated to be $40/h, provided the machine was used over 1000 hours annually. The Caterpillar 966C rental rate was $67.50/h and included the operator. Maximum screen production occurred when the screen was kept fully loaded. However, the Screen-All could not be kept full when the front-end loader was also used to load trucks. Table 1 shows the production of the loader and screen as observed during our studies and the expected potential production if the screen was utilized 100% of its time.

TABLE 1. Estimated Productivity and Production Cost with Full Screen Production.

	PRODUCTIVITY AND COST							
	OBSERVED DURING STUDIES				ESTIMATED WITH FULL SCREEN USAGE*			
	BY INPUT VOLUME		BY SCREENED VOLUME		BY INPUT VOLUME		BY SCREENED VOLUME	
	(m^3/h)	(\$/m^3)	(m^3/h)	(\$/m^3)	(m^3/h)	(\$/m^3)	(m^3/h)	(\$/m^3)
Pit #1	35.9	2.99	22.3	4.82	45.7	2.35	28.4	3.78
Pit #2	98.2	1.09	62.0	1.73	132.7	0.81	84.0	1.28

*The productivity and cost shown can only be achieved if the machines work without idling.

IMPROVEMENTS: The screens were wire-mesh type and bent during the experiment. Also, round rocks got caught in the square holes. The operator would spend half an hour per day removing these rocks. MacMillan Bloedel Ltd. personnel felt that if the screens were made from sheet steel with round or hexagonal holes, the bending and plugging problems would be resolved.

INFORMATION: This report is based on limited field observation and is published only to disseminate information to FERIC member companies. More information may be obtained from:

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