

# FIBRE WASHING USING A DYNAMIC WASHER

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The fibre produced from empty fruit bunches using a crusher and mechanical screw has a high percentage of fines. For certain products, fines in the fibre matrix are undesirable. The fines may be short fibre fragments and peeled-off cell walls. A dynamic washer has been designed by MPOB recently to remove fines from oil palm fibre.

## THE PROCESS

Crude fibre produced by a crusher and mechanical pressing is loaded into a vertical vessel with a helical screw rotor extended upward. Three baffle plates are installed inside the vessel to break the circular motion of the water and fibre mixture, so as to randomize the movement of fibre in the tub. Hot water is used as the washing medium with the temperature maintained at 40°C. The fibre-to-water ratio is maintained at 1:4 to ensure complete immersion of the fibre in water. By helical motion of the mixture, the fibre becomes disintegrated and the fines are caught in the water phase to



Figure 2. Dynamic washer.

be drained off at the end of the washing cycle. Additional hot water is then pumped through the bottom of the vessel to suspend the fibre which is then washed out through side outlet port. The washing cycle may be repeated according to the product specifications. The cleaned fibre may be dried for storage or channelled to a thermo-mechanical pulping plant for production of cottonized fibre.



Figure 1. Crude oil palm fruit bunch fibres.



Figure 3. Cleaned fibre.

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**TABLE 1. SUMMARY OF RESULTS ON EMPTY FRUIT BUNCH FIBRE WASHING USING A PILOT UNIT HYDRA-WASHER**

Raw material	Raw fibre (ex-fibre processing plant in palm oil mill)
Hydra washer size	50 litres
Fibre to-water ratio	1:4
Rotor speed	15 rpm
Washing temperature	40°C
Raw material fines content	6%– 8%
Clean fibre fines content	≤ 0.8%
Washing cycle	30 min

**TABLE 2. ECONOMICS OF FIBRE CLEANING USING A DYNAMIC WASHER ( 20 t per day) OPERATED AT 305 DAYS PER YEAR**

Equipment cost, including water recycling system	RM 1 000 000
Capital costs per year (depreciation in 5 years)	RM 200 000
Operating costs	
Raw material, 20 t per day	305 000
Repair & maintenance 2.5% of capital	15 000
Water, 4 x 20 t (50% recycled)	1 586 000
Electricity, 20 kW	19 764
Total O&M costs	RM 1 925 764
Sale of clean fibre RM 400 per tonne	RM 2 293 600
Payback period	5.9 years

### APPLICATION

The dynamic washer may be installed in a fibre production plant to produce high quality clean fibre or in a thermo-mechanical pulp plant to produce cottonized fibre. The washer is normally installed with the necessary fibre conveying

systems and automatic process sequencer using the PLC system.

### ECONOMICS

The installed cost for a 20 t per day dynamic washer is RM 1 000 000. The payback period for the investment is about six years.

For more information kindly contact:

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