

MPOB Guidelines for Survey Officers – Approval of Mill Expansion

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The following are the key areas to be analysed before approval for expansion is granted as indiscriminate expansion can cause (a) delivery of bad quality fresh fruit bunches (FFB) to the mill, (b) unhealthy competition for FFB, (c) poor mill extraction efficiency and (d) poor quality of oil produced.

This survey and analysis will serve as a solid record for the field officers of the reasons leading to a decision for the approval or rejection of a mill expansion and can be freely made available for scrutiny to the industry, if any dispute arises.

FRESH FRUIT BUNCHES (FFB) AVAILABILITY

Availability of FFB is the most important factor when mills apply for MPOB approval to expand their mills. Great care should be exercised to ensure that the expected additional crop is always available to the mill seeking approval. If this additional crop is from a newly cultivated area, there is no difficulty in approval but if it is used to be processed by another mill, its purchase by the expanded mill will set in motion an unhealthy competition among the mills resulting in poor quality crop being delivered to the mill. In such cases, the request for expansion is not justified as the crop already has a buyer.

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In order to standardize the approval requirements, MPOB has drawn up some simple approval criteria as a means to protect the industry. In general, a mill is expected to process only 20 hr a day, leaving 4 hr for manual removal of boiler ash, if they are not fitted with automatic ash evacuation system.

The majority of the mills in Malaysia generally do not get the rated throughput due to process interruptions arising from many factors; the common factor being the non-availability of sterilized crop or some chokages along the process flow line. A 45 t hr⁻¹ mill can be expected to process an average of 40 t hr⁻¹ giving a total of 800 t day⁻¹ or 960 t day⁻¹, if the boilers are fitted with continuous ash removal system. Hence, when deciding on expansion of a mill, use the actual mill throughput instead of the rated throughput of the mill as that is more accurate. Forcing a mill to process more than what it can reasonably be expected to process will only result in high process losses.

PLANT CAPACITIES

Hoppers

Mill expansion should not be allowed, if the hoppers do not have the storage capacity as otherwise, the mill may be tempted to dump them on the hopper top causing considerable damage to crop quality. The mill hoppers should be able to store the anticipated crop without the need to dump them on hopper top.

The method of determining the storage capacity is given below:

Present mill (say)

Actual mill throughput = 40 t hr⁻¹

Average crop per day = 800 t

The crop delivery normally takes place from 9.00 am to 6.00 pm (9 hr). During this time, mill can only process 360 t FFB and as such 800 – 360 = 440 t of FFB will have to be stored in the hoppers. If one hopper bay can take 15 t (some are 10 t or even less), the number of hoppers needed will be 30.

If the crop is increased to 960 t and the milling capacity increased to say, 55 t hr⁻¹, in 9 hr, the mill could have processed 55 x 9 = 495 t. The remaining 960 – 495 = 465 t will need a hopper storage capacity of 31 bays. In this case, a hopper expansion may not be needed as it is close to 30.

Sterilizers

If the total sterilization time is 90 min (door open/door shut duration) and there are four units of sterilizers each with a capacity of 22.5 t, a total of 22.5 x 4 = 90 t of FFB can be cooked in 90 min. This will work out to be:

$$(90 \times 60) / 90 = 60 \text{ t hr}^{-1}$$

In this case, the existing sterilizers are sufficient to handle the proposed expansion.

Presses

This is simple but again the actual press throughput may not be the same as the rated throughput. A 15 t hr⁻¹ press may only give 12 t hr⁻¹. Find out the average presses from the mill production book. These values are recorded daily. If a mill has only four presses with an average press throughput of 12 t hr⁻¹, the mill can only process 12 x 4 = 48 t hr⁻¹. If the mill wants to process 60 t hr⁻¹, an additional press will be required.

Digesters

Sometimes the mill may upgrade 10 t hr⁻¹ presses to bigger units of 15 t hr⁻¹, without

upgrading the digesters resulting in improper digestion of fruits. In such cases, the mills should be advised to upgrade the digesters before approval can be given. If the capacity of the existing digester is 3 t and the press capacity 10 t hr⁻¹, the retention time within the digester is 18 min. Now if a press is upgraded to 15 t hr⁻¹, the digestion time is reduced to 12 min. Therefore, when upgrading the press, the digester also should be upgraded.

Boilers

Insufficient steam is one of the prime reasons for high oil losses in a mill. The steam required for processing 1 t FFB hr⁻¹ is 0.6 to 0.65 t. For a 60 t hr⁻¹ mill, the steam required is 36 to 39 t hr⁻¹. If the mill already has a boiler capable of generating 25 t hr⁻¹ steam, another boiler of almost the same capacity will be required to process 60 t hr⁻¹.

Power Plant

Processing requires about 15 to 18 kW power per tonne FFB including power supply to mill personnel domestic consumption. The power requirement for a 45 t hr⁻¹ and 60 t hr⁻¹ mill are (taking the higher figure) 810 kW and 1080 kW respectively. If the existing turbine is rated at 900 kW, the mill will have to purchase another unit having a capacity of 1200 kW, so that it can operate on 90% load while processing. Some mills may generate more for supplying power to the whole estate as well. In such cases, the unit consumption will be more. The actual unit consumption may be obtained from mill records.

Effluent Treatment

The mill expansion from 45 t hr⁻¹ to 60 t hr⁻¹ is bound to generate an additional 33% effluent and if the existing ponds are unable to maintain a BOD level below 100 ppm all the time (check the mill record), the mill should not be allowed the proposed expansion unless it increases the capacity of the ponds. The same applies to mills employing other methods of effluent treatment.

The approval for mill expansion will be based on the following guidelines:



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Capacity now – t FFB hr ⁻¹		Requested capacity – t FFB hr ⁻¹	
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B. ANALYSIS OF PLANT AND MACHINERY CAPABILITY

Name of the company: _____

Name of the mill: _____ License number: _____

Location: _____

Telephone numbers: _____

B.1 Background of the mill:

1. Date commissioned: _____ 2. Capacity: _____ FFB t hr⁻¹

3. Throughput to date (this year) : _____ FFB t hr⁻¹

4. MPOB approved capacity: _____ FFB t hr⁻¹

5. Mill expansions: _____

(a) Date: _____ Throughput : _____ FFB t hr⁻¹

(b) Date: _____ Throughput : _____ FFB t hr⁻¹

Average extraction in (year) (a) OER _____ % (b) KER _____ %

B.2 Plant Capacities:

1. Number of hoppers: _____ Storage capacity: _____ t FFB

(FFB unloading bay on hopper top should not be considered as FFB storage area)

2. Number of sterilizers: _____ Capacity per unit: _____ tonnes, Cycle time: _____ min

3. Throughput possible: [No. of sterilizers x capacity/unit x 60]/cycle time in min

e.g. $4 \times 25 \times 60/90 = 66.7 \text{ t hr}^{-1}$

4. Types of presses and throughputs: [e.g. (a) P15 x 3 = 45 t (b) Stork 10 x 2 = 20 t]

An example is given below:

(a) P 9 = 10 t hr⁻¹ (b) P 9 = 9.5 t hr⁻¹ (c) P 15 = 14 t hr⁻¹

(d) P 15 = 12 t hr⁻¹ (e) P 15 = 13.5 t hr⁻¹ (f) P 15 = 15 t hr⁻¹

Total = 74 t hr⁻¹



5. Digester capacity (in m³ hr⁻¹) referring to above:

- (a) 3 (b) 3 (c) 3.5
 (d) 3.5 (e) 3.5 (f) 3.5

6. Boilers

No.	Make	Type	Pressure Bar (g)	Steaming capacity (t hr ⁻¹)
1	ABC boiler	Water tube	300	30
2	DEF boiler	Water tube	250	20
3	GHK boiler	Fire tube	250	10
4				
5		Total		
6				
7				
	Total steaming capacity			t hr⁻¹

Total steam required by the mill: (at 0.6 t / t FFB) _____ t hr⁻¹

Steam for purposes other than milling, if applicable _____ t hr⁻¹

Total steam consumption /hr: _____ t hr⁻¹

7. Power plant (steam turbo-generators and diesel generators)

No.	Make/Model	Rated capacity (kW)
1	ABC steam turbine	1 200
2	DEF steam turbine	1 000
3	JKL diesel engine	800
4	MNO diesel	200
5		
6		
7		
8		
	Total for the year (kWhr)	35 823 500

Current power requirement for processing = 935 kW

(where 935 kW is the electrical load as indicated by the kW meter)

Current electricity consumption for processing

1 t FFB including domestic consumption:

935/ 55 = 17 kWhr

(where 55 t hr⁻¹ is the mill throughput)

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8. Effluent plant:

- (a) Disposal method: digestion ponds/digestion tanks/ _____
- (b) Number of effluent digestion ponds: _____
- (c) Designed capacity:
 - (i) Anaerobic ponds _____ m³
 - (ii) Aerobic ponds _____ m³
- Hydraulic retention time
 - (i) Anaerobic ponds _____ days
 - (ii) Aerobic digestion ponds _____ days
- (d) Volume applied to the field _____ m³.at BOD level _____ ppm
 Hectares available near the mill _____ ha
- (e) Volume discharged into river _____ m³ at BOD level _____ ppm
- (f) How far is the nearest settlement/housing area? _____ km
- (g) Any commercial aquatic life breeding industry down stream the river,
 where the mill effluent is discharged: _____ If Yes, distance _____ km

9. Is the CPO storage capacity sufficient for 1.5 months production (Yes/No) _____

C. Data Analysis

No.	Plant – capacity sufficient?	(Yes/No)	Remarks
1	Hopper		
2	Sterilizer		
3	Digester		
4	Press		
5	Boiler		
6	Power plant		
7	Effluent treatment plant		
8	CPO storage capacity		

Comments if any:

D. Recommendation

I / we recommend/**do not** recommend the proposed mill expansion from

_____ t FFB hr⁻¹ to _____ t FFB hr⁻¹ _____

for the following reasons:

Field officer : _____ Signature _____ Date _____

Approving authority: _____ Agree/Disagree with the recommendations:

Officer _____ Signature _____ Date _____