

# PROCESS SYSTEM FOR PRODUCTION OF SHELL FREE PALM KERNEL

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JUNE 2003

# 204

**MPOB TT No. 190**

MPOB INFORMATION SERIES

ISSN 1511-7871

**M**alaysian palm kernel crushers are encouraged to further improve their operations through producing higher quality palm kernel oil (PKO) and palm kernel cake (PKC). Inconsistency in dirt and shell content of palm kernel sold and delivered to the crushing plants was identified as one of the factors that affects the final products quality and efficiency of crushing plant operation. A study conducted by Rohaya and Osman (2002) on quality of palm kernel received by the kernel crushing plants showed higher variation in shell content at 3.0% to 11.0%, whole kernel content at 50%-67% and 24%-35% of broken kernel.

Palm kernel quality is highly dependant on the palm oil mill quality control procedure and practice. Most Malaysian palm oil millers adopt MEOMA specifications in their kernel trade. The specifications allowed 7% dirt and shell content with maximum tolerance of 10% and buyer have an option to reject shipment above maximum amount. There is no reward premium to sellers who produce better quality palm kernel. Thus, it discourages millers to improve the product quality.

Palm kernel with high dirt and shell content yield lower oil extraction rate. It causes higher down time and increases operational and maintenance costs due to higher wear and tear of the screw press. Higher metal contamination of the PKC was also reported. Shell is a good medium to retain and absorb oil especially crude

palm oil (CPO) (Rohaya and Osman, 2002). Thus, it contributes to darker colour and increases iodine value (IV) of the PKO.

MPOB has developed process system to separate and clean shell and dirt from palm kernel at the crushing plant as shown in *Figure 3*. The system is capable of producing low dirt and shell palm kernel (less than 2%). It is technically and economically feasible to be integrated in the existing mills process system. This invention produced shell free palm kernel also known as Malaysian Palm Oil Board Quality Palm Kernel. This invention is able to enhance the quality of palm kernel products, improve and optimize the palm kernel drying system for production of feed quality PKC.

## EXISTING MALAYSIAN PALM KERNEL QUALITY STANDARD FROM RECENT SURVEY IN 2000 TO 2002

### Physical Properties of Palm Kernel:

Whole kernel	50.9% - 67.0%
Broken kernel	23.5% - 34.9%
Half cracked nut*	1.0% - 2.8%
Whole nut*	0.7% - 1.6%
Shell	3.9% - 11.3%

\*Contributed minimum of 50% shell to the palm kernel.

Oil content in palm kernel shell	9.2% - 15.3%
Residue oil in PKC	7.5% - 13.2%
Shell content in PKC	6.3% - 21.0%





*Figure 1. Existing commercial grade palm kernel.*



*Figure 2. Shell free palm kernel.*

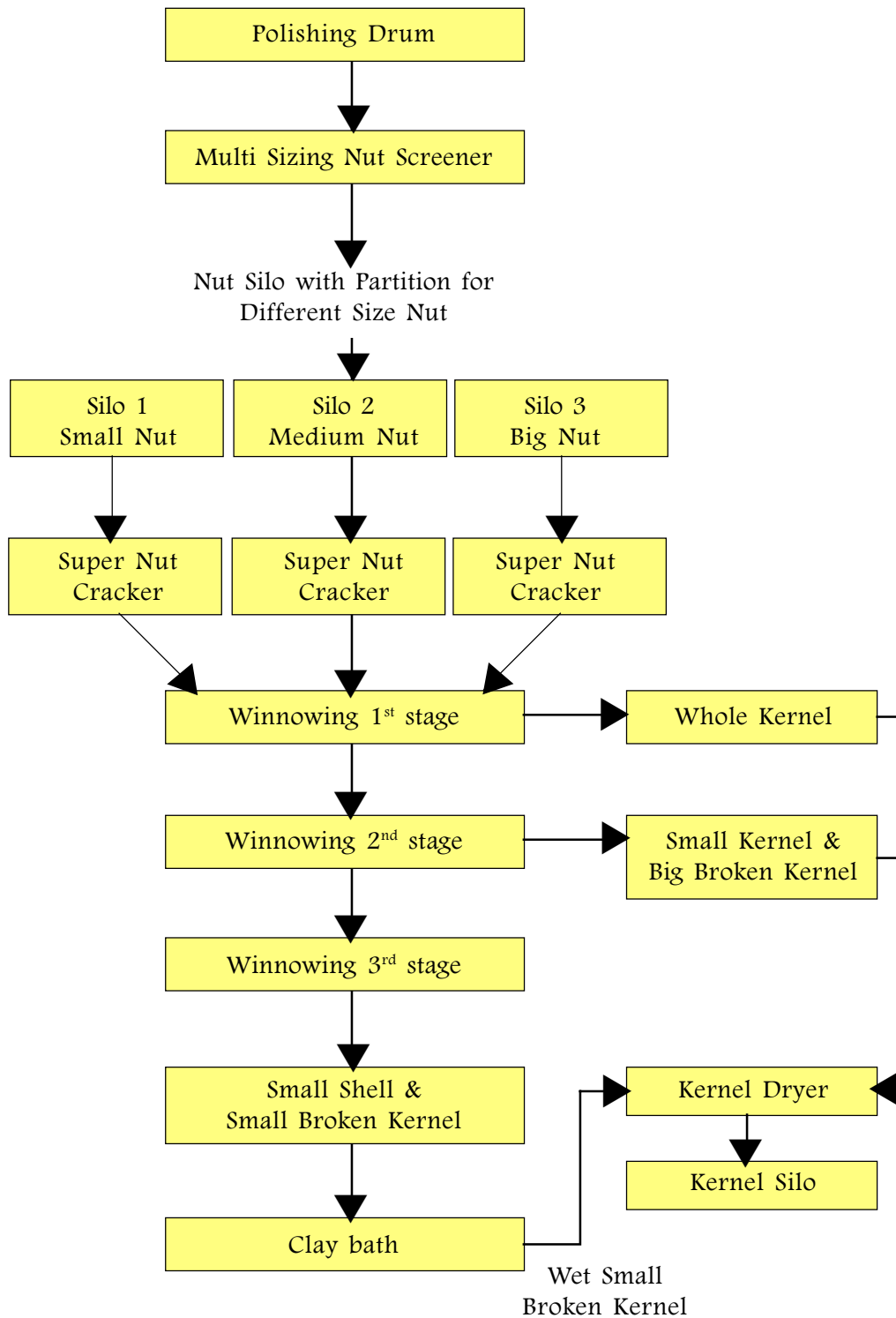


Figure 3. Flow process system for production of shell free palm kernel.



Figure 4. (a) Crude palm kernel oil extracted from shell free palm kernel (right); (b) Crude palm kernel oil extracted from existing commercial palm kernel (left).



Figure 5. (a) Palm kernel cake produced from shell free palm kernel (right); (b) Palm kernel cake derived from existing commercial palm kernel (left).

### CHARACTERISTICS OF SHELL FREE PALM KERNEL

Shell free kernel	98.0% min
Dirt & Shell	2.0% max

### BENEFITS OF SHELL FREE PALM KERNEL

- Very low dirt and shell content (2.0% max);
- Increase crude palm kernel oil (CPKO) recovery (46%-48% min);
- Improve CPKO quality: lighter colour;
- Reduce oil residue in PKC (5.0% max): good shelf life and less prone to oxidation damage;
- Significantly reduce wear and tear of the screw

press;

- Reduce metal contamination in CPKO and PKC; and
- Improve feeding value of PKC (increase crude protein and energy availability).

### ECONOMIC EVALUATION

Improvement of PKO extraction rate at 1% yield an additional 17 000 t of PKO with total value of RM 28.9 million. Therefore, increasing the PKO extraction rate by 3%-4% will yield an additional 59 500 t of PKO with an estimated value of RM 101 million. PKC produced from shell free palm kernel is superior in quality which lead to a better price received by sellers and kernel crushers. It is a new milestone for the kernel crushing plants business activities, not only crush palm kernel for PKO, but also for production of shell free PKC as feed for livestock industry.

### REFERENCES

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