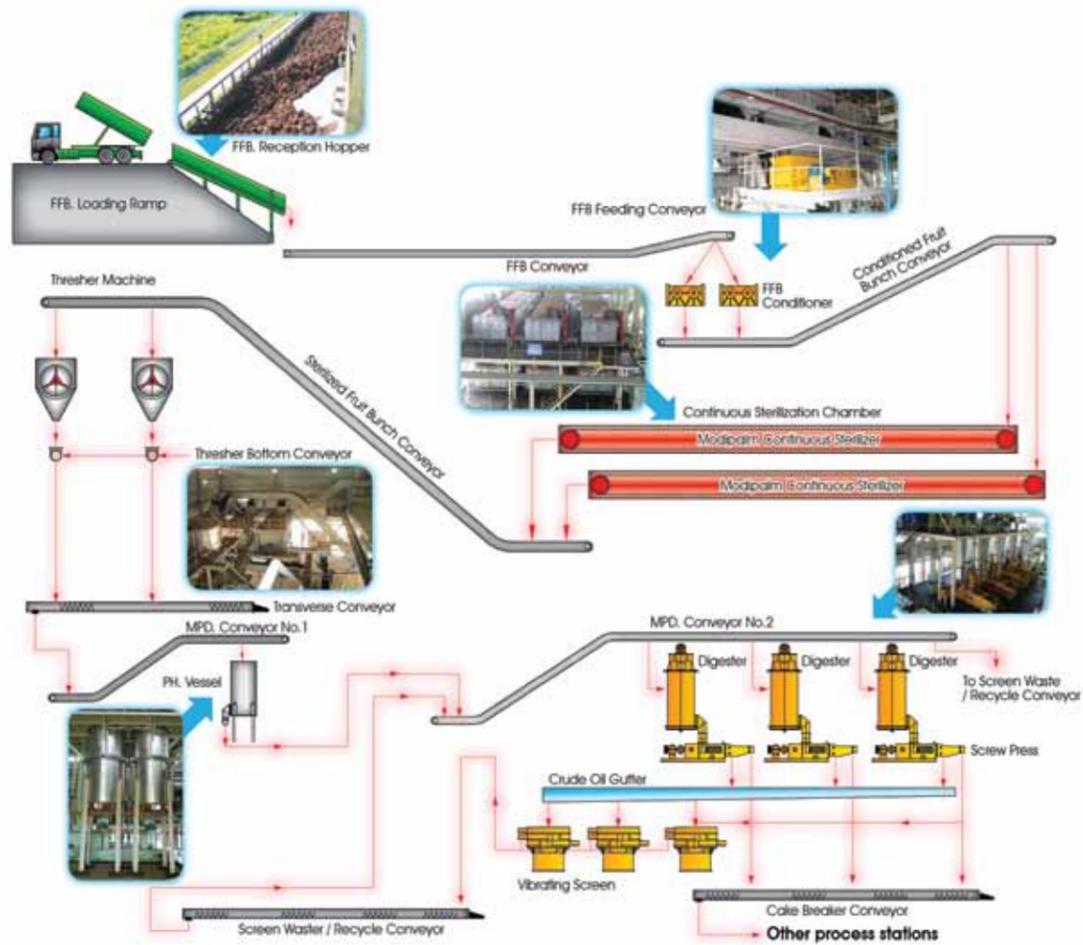


CONTINUOUS STERILIZATION SYSTEM



Certificate No : KLR 6006455

For further details please contact:



MODIPALM ENGINEERING SDN BHD

(A Wholly Owned Subsidiary Of CB Industrial Product Holding Berhad)

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MODIPALM

continuous sterilization



EQUIPPING PALM OIL MILLS
WITH GREEN TECHNOLOGIES
AROUND THE WORLD





INTRODUCTION

We have more than 30 years of experience manufacturing plant & machinery, equipment & parts for palm oil mills, and is one of the largest one-stop centre for the design, manufacture, procurement, supply, construction and commissioning of the entire palm oil mill of any size. The size or milling throughput can be as small as 5 tons FFB an hour to as big as 120 tons per hour.

We started off as a turnkey contractor for the construction of conventional mills but we are now focusing more on our proprietary Modipalm Continuous Sterilization technology to replace the conventional sterilization process.

We are the joint patent holder of the revolutionary Modipalm Continuous Sterilization technology which can help the plantation industry to:

- Improve mill cleanliness and safety
- Improve oxidative stability of crude palm oil
- Reduce labour and maintenance costs
- Reduce boiler black smoke emission
- Reduce diesel consumption and carbon foot-print
- Reduce effluent production and greenhouse gas emissions

We are also capable of undertaking palm oil milling related projects such as palm kernel crushing plants, bio-mass power generation plants, palm oil mill effluent tertiary treatment and methane gas capturing plants.

OUR SERVICES

DESIGNING

we have the latest designing tools to create, improve and upgrade new and existing products

ENGINEERING

we have vast years of experience in engineering and palm oil milling capabilities

CONSULTATION

we have the capability to provide customers base on needs, requirements and even a proposed budget

SUPPORT CENTER

we are just a call away when in need to solve a problem or trouble-shoot your equipments



STRENGTH POINTS

- Our core strength is its engineering expertise and experience
- The only integrated engineering, equipment and spare parts player in the world for palm oil mills
- Ability to undertake all aspects of a project – feasibility studies, plant layout design, equipment procurement, construction, installation
- Leveraging on solid reputation to undertake full-fledged turnkey contracts
- Extensive product range covers more than 90% of the requirements of a palm oil mill
- A market leader with an international presence





MODIPALM CONTINUOUS STERILIZATION TECHNOLOGY

Conventional Sterilization

The *conventional sterilization* of fresh fruit bunches (FFB) is a batch process lasting about 90 minutes in a pressure vessel or sterilizer at 3-bar (40 lb per sq inch) steam temperature of about 140° C to cook the FFB in fruit-cages. The high temperature and long cooking time is necessary to adequately cook the fruit bunch in the cage. A typical conventional palm oil mill requires two or more very long and large diameter cylindrically shaped sterilizers to take turn to sterilize the fruit bunches in batches. Each batch would consist of a train of cages loaded with fruit bunches, and the number of cages in each train varies according to the capacity of the horizontal sterilizer. Upon completion of sterilization, each batch of fruit-cages is pulled out of the sterilizer either by a rope capstan or by a tractor or by a hydraulically-operated indexer-system depending on the design of the mill. In the older designs, an overhead hoist lifts the cage about 7 meters high to a threshing machine and the cage is tilted to discharge the sterilized fruit-bunches to the threshing machine one cage at a time. In the contemporary designs, a tipper tilts the fruit cage at ground level into a conveyor which carries the cooked fruit bunches up to the threshing machine. The rate of discharge of sterilized fruit-bunches depends on the skill of the operator, and can be erratic and uneven. Erratic feeding of the threshing machine will cause poor bunch stripping, hence higher losses in the form of some oil-bearing fruits still attached to the empty fruit bunches.

Each cage holds about 3.5 tons FFB but in the newer designs each cage can hold up to 15 tons of FFB. A 3.5 tons cage can hold between 110 and 200 FFB, depending on the size of the fruit bunches. Owing to the geometry of the fresh fruit bunch, air is trapped in the voids among the heap of FFB inside each cage. When steam is admitted into the sterilizer, it is inevitable that part of the air is mixed with the steam and is trapped within the crevices, which reduces the effective cooking temperature. In order to purge as much air as possible from the sterilizer, it has now become standard practice to blow-down the sterilizer for each batch of FFB to almost zero-pressure three times for each cooking cycle as a pre-requisite for effective sterilization of the FFB (known as "triple-peak sterilization").

The effectiveness and consistency of air removal depends on the geometric and spatial formation of the FFB inside each cage, and varies in accordance with the size and orientation of the fruit bunches as well as the size of the cage. The *triple-peak sterilization* technique consumes a lot of steam and that requires the installation of a large capacity boiler, which burns up large quantities of fibre and shell, leaving small surpluses of solid fuel for the following day's starting-up requirements. Inconsistency in achieving *triple-peak sterilization* cycles is common due to inadequate steam supply, especially in the older mills that have smaller boilers.

Improper sterilization would result in the poor stripping of the fruit from the bunch stalks during the "threshing process". Some mills deploy a worker to look out for partially un-stripped fruit bunches after the threshing machine for recycling but this is often regarded as inefficient and inconsistent because the work is laborious and tedious. Hence, partially un-stripped fruit bunches could be frequently found among the empty fruit bunches in conventional mills.

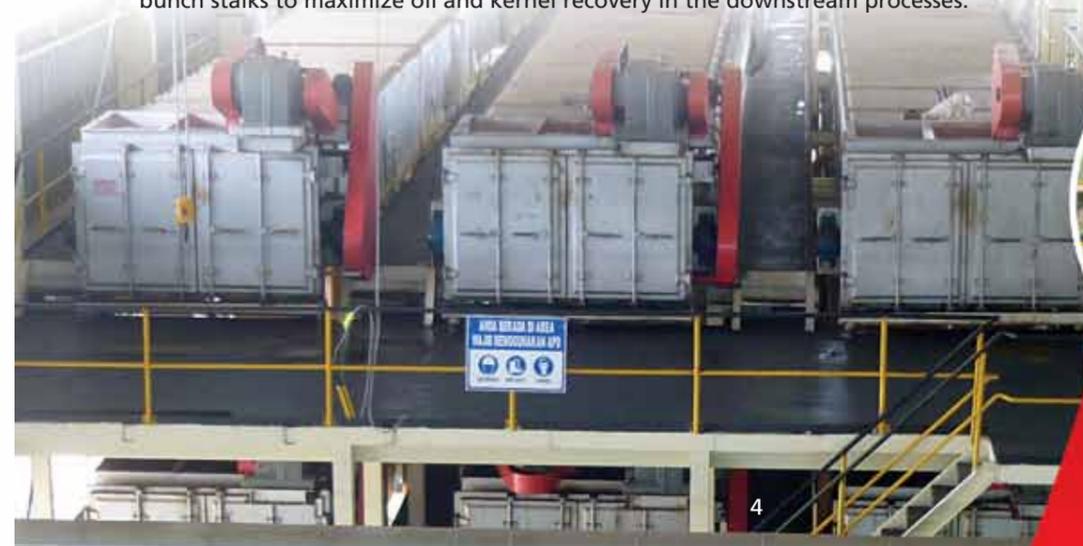
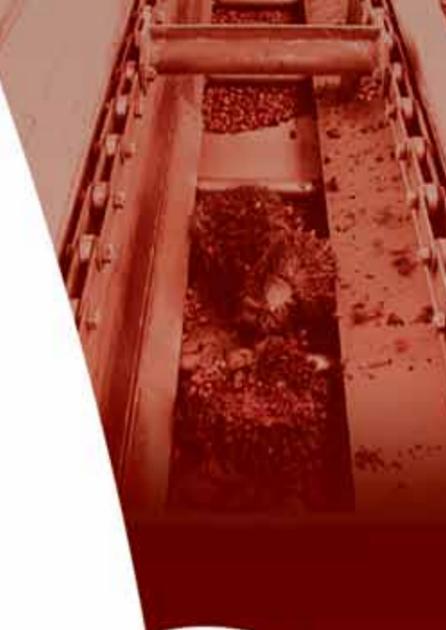
MODIPALM Continuous Sterilization (CS)

The Modipalm Continuous Sterilization process, on the other hand, uses saturated steam at atmospheric pressure at about 100° C to cook the fruit bunches in a non-pressurized cooking chamber for about 80 minutes (compared to 140° C and cooking time of 90 minutes in the conventional process). Researchers have long established that at 70° C the temperature is sufficient to deactivate fat-splitting enzymes or lipase that is responsible for the splitting of palm oil in the fruits into Free-Fatty-Acids and glycerol. They have also established the susceptibility of palm oil to oxidation under high temperatures and in the presence of oxygen (air). In fact palm oil technologists have long been advocating temperatures as low as practicable for the sterilization process and for the storage of crude palm oil in order to minimize oxidation.

FFB is split into smaller pieces by a mechanical bunch conditioner before it enters the continuous sterilizer. Inside the continuous sterilizer, a slow moving conveyor carries the conditioned FFB not more than two-bunch deep through a steam chamber, in which low-pressure steam is continuously injected to cook the fruit bunches. Air removal from the crevices of the fruit bunches and sterilizing chamber is a lot more effective than conventional sterilization. The conditioning of the FFB is to ensure that the fruit bunches, particularly the big ones, are loosened up to promote steam contact with a larger surface area of fruit bunch and to enhance deeper steam penetration inside the fruit bunch. Since the fruit bunches are piled not more than two-bunch deep across the width of the continuous sterilizer, air is very quickly displaced by steam whilst steam penetration of every fruit-bunch inside the continuous sterilizer is immediate. Therefore, the transfer of heat energy from the steam to each and every fruit bunch is every efficient and effective. That is why the Modipalm Continuous Sterilization process is able to cook the FFB efficiently and effectively at a lower temperature and shorter cooking time, compared to the conventional batch process.

In the case of conventional sterilization, FFB is stacked inside cages about 1.25 meters deep in the case of the 3.5 tons cage, and 1.7 meters deep in the case of the 10 tons cage. The FFB is firm and hard before cooking, but turn soft and tender when cooked in steam. The weight of the fruit bunches on top is sufficient to press some oil out of the soft fruits at the bottom, and such oil is drained off from the sterilizer together with the condensate. This is where the Modipalm Continuous Sterilization process has an edge over conventional sterilization because of the thin layer of fruit bunches not more than 2-bunch thick along the length and width of the conveyor, hence very little loss of oil in the condensate.

The flow of fruit bunches through each sterilizing chamber to the threshing machine is continuous and at constant speed, hence enabling the threshing machine to very effectively separate the oil and kernel bearing fruits from the bunch stalks to maximize oil and kernel recovery in the downstream processes.





THE BENEFITS OF MODIPALM CONTINUOUS STERILIZATION TECHNOLOGY

Smaller Footprint, Less Machinery and Less Labour

Elimination of horizontal sterilizers, cages, tractors, skid-steer loaders, railway tracks, cage transfer carriages, winches, capstans, and mono-rail hoists or cage tippers significantly reduces manpower, machinery replacement and maintenance costs year after year.

Better Safety & More Conducive Working Environment

- Small foot-print, no fruit spillages, no oil drippings on the floor
- No sterilizer pit, clean factory floor below the continuous sterilizers
- Less cleaning work hence cost savings on house-keeping
- Quiet operations, no noisy steam exhausts
- Safe, clean and quiet working environment

Not A Pressure Vessel & Is Easy To Operate

The continuous sterilization is not a pressure-vessel and is easy to automate the whole process from the FFB reception station to the threshing station. Not necessary for annual shutdown for inspection and certification by the Dept of Occupational Safety & Health, thus, reducing downtime.

Environment-Friendly

Steam and power demand by the continuous sterilization process is constant. No surges in steam and power demand from the boiler and turbines respectively. Boiler operating under constant load and black smoke emission is rarely seen except during furnace cleaning.

Continuous sterilization produces less condensate with lower oil loss.

Efficient Use of Energy

Efficient use of steam and high bunch-stripping efficiency generates surplus biomass for prolonged operation of the power plant to reduce dependence on supplementary power from the diesel generators, which are costly to operate and to maintain.

The elimination of tractors or hydraulic skid-steer loaders for the shunting of fruit-cages also provides long-term cost savings on consumables such as diesel and tyres.

Less Oil and Kernel Losses

Low oil loss during the continuous sterilization process and excellent separation of fruits from the bunch stalks during the threshing process translate to higher oil and kernel recovery efficiencies in a Modipalm mill.

Excellent Oil Oxidative Stability

High DOBI Value of 3 and above for crude palm oil consistently achieved by Modipalm mills due to low temperature and efficient air removal during sterilization.

Effective De-Activation of Lipase Activity

FFA in crude palm oil is comparable to conventional sterilization.

Continuous Sterilizer Improvement

One of the breakthroughs in palm oil milling process is the Modipalm Continuous Sterilization System. The new system is able to increase the efficiency in milling by introducing automation and unpressurised cooking. The benefits have been realized by the end users. Since its commercialization, its setback has impeded the acceptance by the millers towards the new system.

The common setbacks include the chain breakage, low throughput, high FFA and poor kernel separation. Over the last 10 years, the mill capacity has been increase significantly; so as the setbacks. Nonetheless, the initiative to perfect the system has taken place which is summarized as below:

SETBACKS	IMPROVEMENTS
Chain Breakage	<ul style="list-style-type: none"> • Introducing Double Deck Continuous Sterilizer with a shorter sterilizer and hence increase the reliability. • Upgrading link chain breaking load from 40 tons to 50 tons to increase service factor by 25%.
Low Throughput	<ul style="list-style-type: none"> • Introducing Double Deck Continuous Sterilizer with 30MT/Hr throughput. This is suitable to run for 24 hours continuously. • Introducing Steam Dryer to further increase the temperature entering the Continuous Sterilizer. The "drier" steam will improve the throughput of press, also in reducing the condensate.
High FFA	<ul style="list-style-type: none"> • Injecting steam into covered Conditioned Fruit Bunch Conveyor (CFB) to stop FFA enzymatic reactions.
Poor Kernel Separation	<ul style="list-style-type: none"> • Introducing Steam Dryer to further increase the temperature entering the Continuous Sterilizer. This promotes nut dehydration, thus high cracking efficiency.

We appreciate the feedback and suggestion from the users, Continuous Sterilization System has been a success story in palm oil industry. With all the implementations and improvements addressed above, today, Modipalm Continuous Sterilization System has been widely accepted in the palm oil industry not only its superior benefit in milling but also its reliability. Quality has always been our priority. Hence, we strive for continuous improvements to produce a better product.





MODIPALM ENGINEERING PRODUCT - Unsurpassed Quality And Reliability

Over the years, CBIP's products have gained a reputation for consistent high quality and unsurpassed reliability. This is a result of the company's emphasis in R&D and its intensive training and upgrading of skills of its workers, as well as its policy of investing in better machinery, such as CNC machines, and the use of high grade raw materials.

Robust in design and construction coupled with superior workmanship ensure that each piece of CBIP equipment performs under the most arduous and demanding condition.

Key products in the CBIP range include:



1. CB VERTICAL DIGESTER

CB direct steam injection Vertical Digesters come with capacity range from 3000L to 6000L to suit various capacity of screw presses. The simplicity of its design make it easy to operate and low maintenance cost.



2. CB SCREW PRESS

CB Screw Press is design for high oil extraction efficiency and low kernel breakage. Fabricated with high precision machining and high quality material to withstand the rugged environment of its operation and reliable. CB Screw Press standard capacity is 10 Tons, 15 Tons and 20 Tons FFB per hour.



3. CB ROTARY BRUSH STRAINER

The stainless steel CB Rotary Brush Strainer is specially design to continuously remove coarse particle from sludge to protect downstream equipment. Operating at 15 Ton per/hour, CB Rotary Brush Strainer operate at very low power consumption and maintenance cost.



4. CB SLUDGE CENTRIFUGE

CB Sludge Centrifuges are developed for reclaiming palm oil in the sludge. The star bowl/disc bowl is made of high grade material to withstand the heavy wear and tare of its operation with present of sand and other impurities in the sludge. CB Sludge Centrifuge capacity is range from 3000L to 10000L sludge per hour.



5. CB KING CRACKER

The revolutionary designs of CB King Cracker make it cracking the nut with higher cracking efficiency, low investment and maintenance cost. The capacity of 4 Tons, 6 Tons and 8 Tons of nuts per hour widely used by the miller around the world.



6. CB EFB CRUSHER

Single deck and double deck CB EFB Crusher are mainly used at double threshing for fruitlet recovery from the un-strip bunches. The crusher drums are made of high quality grade material to prolong its life span and durable.



7. CB PRESSURE VESSEL AND STERILIZER

Modipalm pressure vessels are design and comply with ASME VII Division I. The vessels are fabricated with high grade steel plate and welded by skill and qualify welder. Equipment such as Vacuum oil Drier, Horizontal Sterilizer, Steam Separator, Back Pressure Vessel, Thermal Dearator, Sand Filter, Water Softener and other are fabricated with strict quality control to ensure the high quality of its products.



8. CB CAGE TIPPER

Modipalm Cage Tipper is rugged and sturdy in design. The two wheels are machined and assembled together to achieve perfect concentricity and balance. Proven and tested hydraulic drive system to ensure smooth and precise movement of cage tipper while handling heavy fruit cage.

9. CB TRANSFER CARRIAGE

CB Transfer Carriage is design to withstand heavy work load and wear and tare arising from daily shunting of heavy fruit cages and the railways track. CB Transfer Carriage fabricated to suit 2.5 tons up to 15 tons FFB Cages.



10. CB THRESHER

CB Thresher is built to withstand heavy shock loads impact by the constant tumbling action of sterilized fruit bunches inside the thresher drum. High strength carbon steel shaft and bosses of the spider arm is machine to very fine tolerance for precision fits to counteract impulsive axial forces. CB Thresher drum is well balanced in term of concentricity and rotary motion.



11. SCREW AND SCRAPER CONVEYOR

Modipalm had improved and develop reliable and high quality screw and scraper conveyor to suit palm oil mill industry. Capable of constructed screw conveyor from Ø300mm to Ø1000mm and scraper conveyor from 600mm to 1500mm width to suit client need.



12. ELEVATOR

Single or double chain bucket elevator is mainly used at Pressing and Kernel Recovery Station. Modipalm is capable to design and build wide range of sizes and height depending on mill requirement.



13. TANK

As a turnkey Contractor with support of experience design team and qualified welder, Modipalm is capable of fabricating various sizes and capacity of tanks for various requirements for palm oil mill such as Vertical Clarifier Tank, Sludge Tank, Water Tank, CPO Tank and others.



14. SILO

Modipalm silo is fabricated with high grade quality material and welded by qualified welder to ensure the quality of the products. Mainly used for Nut Silo, Kernel Silo and Kernel Bulking Silo in palm oil mill.



15. CB KERNEL RECOVERY EQUIPMENT

With 30 years' experience building palm oil mill and continuous R&D effort provide Modipalm knowledge and rapid improvement and development for its equipment for Kernel Recovery Station such as Depericaper, Nut Polishing Drum, LTDS System, Hydrocyclone, Claybath and Destoner System.



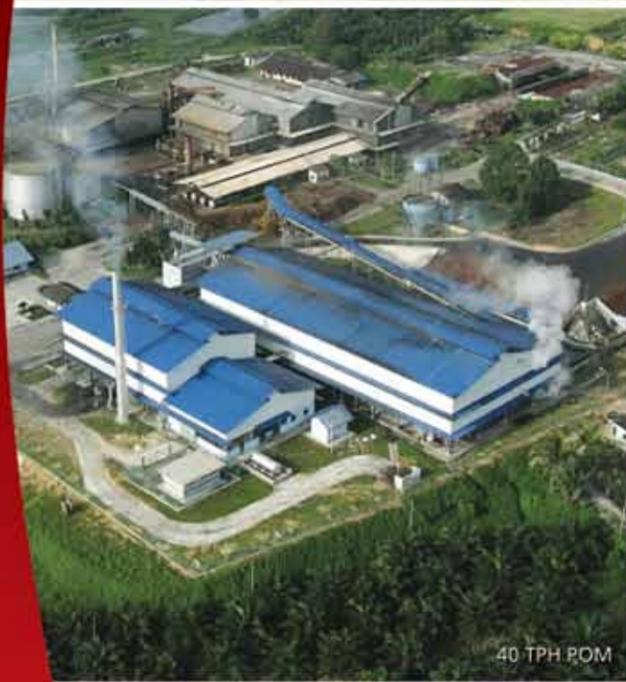
16. EQUIPMENT SPARE PART

Modipalm is the biggest manufacturer for press cages of various type. All Modipalm equipment's spare parts are available as stock to ensure efficient and excellent service after sell. Our strategic focus is to meet the needs of our clients by supplying all spare parts within the palm oil mill with competitive prices.





45 TPH POM



40 TPH POM



20 TPH POM



30 TPH POM



30 TPH POM

PROJECT REFERENCE

1 MALAYSIA

CONTINUOUS STERILIZER MILL

1. FELDA PALM INDUSTRIES SDN BHD – 11 MILLS
2. TRADEWIND PLANTATION – 4 MILLS
3. TABUNG HAJI PLANTATION – 3 MILLS
4. SIME DARBY GROUP – 3 MILLS
5. OTHER MILLER – 8 MILLS

TOTAL CS MILL – 29 MILLS
TOTAL CONVENTIONAL MILLS – 7 MILLS

2 INDONESIA

CONTINUOUS STERILIZER MILL

1. WILMAR GROUP – 11 MILLS
2. TABUNG HAJI GROUP – 5 MILLS
3. PT ASTRA AGRO LESTARI TBK – 7 MILLS
4. PT PP LONDON SUMATRA INDONESIA TBK – 5 MILLS
5. PT MINAMAS (SIME DARBY) – 4 MILLS
6. PT HIJAU ASRI GROUP – 3 MILLS
7. PT SMART TBK – 2 MILLS
8. OTHER MILLER – 4 MILLS

TOTAL CS MILL – 41 MILLS
TOTAL CONVENTIONAL MILLS – 23 MILLS

3 THAILAND

CONTINUOUS STERILIZER MILL

1. UNITED OIL PALM PLANTATION – 1 MILL

4 PAPUA NEW GUINEA

CONTINUOUS STERILIZER MILL

1. CTP GROUP – 2 MILLS
- TOTAL CS MILL – 2 MILLS
TOTAL CONVENTIONAL MILL – 2 MILLS

5 AFRICA

CONTINUOUS STERILIZER MILL

1. EQUATORIAL BIOFUEL – 1 MILL
2. COSAV – 1 MILL

TOTAL CS MILL – 2 MILLS
TOTAL CONVENTIONAL MILL – 1 MILL

6 CENTRAL AMERICA

CONTINUOUS STERILIZER MILL

1. TIKINDUSTRIAS S.A – 1 MILL
 2. NATURACEITES S.A – 1 MILL
 3. NACIONAL AGRO INDUSTRIAL S.A – 1 MILL
- TOTAL CS MILL – 3 MILLS

GRAND TOTAL CS MILL - 78 MILLS

**GRAND TOTAL
CONVENTIONAL MILL - 33 MILLS**

GRAND TOTAL ALL MILL - 111 MILLS

