

Cashew Processing Guides

Number 3

Guidebook to Cashew Nut Processing Equipment



Published by:

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)

Dag-Hammarskjöld-Weg 1 - 5

65760 Eschborn, Germany

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F + 49 61 96 79-11 15

I www.giz.de

Registered offices:

Bonn and Eschborn

Germany

Place and date of publication:

Ghana, June 2019

Responsible editor:

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Guidebook to Cashew Nut Processing Equipment

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A Competitive Cashew initiative publication in cooperation with



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO



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East Legon, Accra, Ghana



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ISBN: 978-9988-2-9225-6

Preface

In 2011, the Competitive Cashew initiative (GIZ/ComCashew) - formerly African Cashew initiative (ACi) - conducted a comprehensive study on cashew nut processing equipment. That study involved a comprehensive survey of African cashew processing plants and individual studies carried out in Vietnam, India and Brazil to assess the equipment available and the suppliers who manufactured it. The study revealed areas of concern related to cashew nut processing, especially in relation to the selection of equipment, commissioning, installation and management of machines. At the time, the mechanisation of cashew processing (although a feature in very large-scale plants for many years) was becoming feasible for medium and smaller plants after the advent of automatic peeling machines and cashew cutting or cracking machines.

Following the study, the Competitive Cashew initiative (GIZ/ComCashew) published a series of five guides to provide practical guidelines to new processors with processing equipment selection and existing processors who plan to upgrade or expand their facilities or capacity.

The purpose of this Processing Guide Number 3: Guidebook to Cashew Nut Processing Equipment is to provide an overview of the technical information on a range of cashew nut processing machines and to provide a list with contacts for 170 selected suppliers of processing equipment. It provides basic guidelines and information on the different types of processing equipment and their function in the process.

Acknowledgements

In developing this Guidebook, we received contributions and support from several partners and industry stakeholders, to whom we are deeply grateful. We acknowledge, with thanks, the support of two groups of collaborators:

1. **Cashew Stakeholders: This guidebook is built on our shared learning over the years**
 - African Cashew Alliance
 - Association Nationale des Transformateurs d'Anacarde du Burkina Faso
 - Cashew Club
 - Cashew Industry Association and Processors in Ghana
 - Conseil du Coton et d'Anacarde de la Côte d'Ivoire
 - Conseil National des Transformateurs de Cajou du Benin
 - Groupement des Industriels du Cajou de Côte d'Ivoire
 - Ministère d'Agriculture de la Côte d'Ivoire
 - Ministère d'Agriculture, Elevage et Pêche du Benin
 - Ministère d'Agriculture, et des Aménagement Hydraulique and the Direction Générale pour la Promotion de l'Economie Rurale du Burkina Faso
 - Ministère du Commerce, l'Industrie et de l'Artisan du Burkina Faso
 - Ministère de l'Industrie et des mines de la Côte d'Ivoire
 - Ministry of Food and Agriculture of Ghana
 - Ministry of Trade and Industry of Ghana
 - Technoserve
2. **Technical review committee, which participated in reviewing the manuscripts for publication: Jace Rabe (Tolaro Global), Tarciso Falcao (Usibras), Kanata Namaro Koné (Cajou Industrie), Minata Koné (Sotria-B), Georgette Taraf (Nad & Co), Rita Weidinger (GIZ/ComCashew), Ernest Mintah (African Cashew Alliance) and Helene Widmer (GIZ/ComCashew). We acknowledge and are grateful for your contributions. Your critical feedback has enriched the content of this guidebook.**

The Technical Review Committee reviewed and approved the final draft of the manuscript for publication; we are grateful for their contributions in the publication of this guidebook.

We acknowledge the contribution of the following persons: Anthony Youdeowei (International Publishing Consultant), Nunana Addo (GIZ/ComCashew) and Sylvia Pobee (GIZ/ComCashew).

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1. Introduction

Innovation in cashew processing equipment has continued since the study was done in 2011. There have been significant advancements in sophisticated peeling and shelling lines at the higher end of the technological spectrum for medium and large-scale factories. There have also been significant advancements in standalone machines for medium and small-scale factories. This has created an array of challenges for new entrants and existing processors in assessing machines for new systems and the integration of new machines into existing systems.

The cashew processing equipment industry has become dynamic because of these innovations. Many processors who bought machines during the first wave of innovation (2007-2011) are now interested in replacing those machines. They find that they are faced with more choices of machines and suppliers, and enhanced claims on equipment performance. The latest machines are far ahead of earlier generations of peeling and grading machines, and especially shelling machines. Colour sorters have become commonplace in cashew-processing factories because of the availability of newer, cheaper machines from suppliers in China, India and Vietnam. Potential buyers may be offered a machine which is not the latest model, as suppliers want to deliver the latest innovations to existing customers in their home countries.

Buyers may also find that between the initial quotation and plant construction and installation phase, machines offered have been improved for higher performance, which also means higher purchase price. Therefore, although cashew processing investment returns and the speed of entry to the market have been improved by the new innovations, the importance of machine and supplier knowledge has increased, as the market has developed.

The cashew-processing equipment market has changed in other ways too. The most noticeable change is the diversification of the supply sources. When the 2011 study was conducted, only Vietnamese suppliers offered real solutions for medium and small, mechanised cashew factories, with Oltremare of Italy being a viable alternative for larger scale projects. Today, there are purpose-built cashew machines and production lines from China, India and Vietnam, as well as standalone machines from Sri Lanka, Brazil, Cote d'Ivoire, Ghana and Nigeria. European, Japanese and North American manufacturers of multipurpose machines for cleaning, sorting, grading and packing cashews have also begun more actively to engage in the cashew sector. This has been driven by increased enquiries from potential investors in African countries and by the trend of mechanisation in India.

Today, in terms of the investment cost/performance calculation, the picture is a lot less clear than it was six years ago. Vietnam still appears to have taken the lead in peeling and larger scale shelling machines, but India now has a broader spectrum of suppliers, is leading in sorting and grading equipment and rapidly improving its offering of peeling and shelling machines. Chinese suppliers have become active in the market despite China itself not having a significant cashew processing industry. Chinese suppliers offer a range of machines which are similar to the specialist alternatives, but often lower cost. They also are competitive in the supply of multipurpose machines, particularly packing and sorting machines.

The changes in the market reflect the development of the processing industries in each major processing country. In Vietnam, cashew factories have become larger and less labour-dependent due to competition in the labour market. Vietnam has become the largest processor for export, which lends itself to larger, more efficient factories which use high volume, high capacity production lines and as such, require machines which fit these purposes. There are still many pre-process and part process plants in Vietnam, meaning that smaller capacity machines are still being produced and improved.

The cashew sector in India has been on a drive toward mechanisation. Indian cashew production is spread throughout much of the country. Processing has also diversified in location and is now close to production areas and the large city markets of North India. The relocation brings cashew production to areas with higher labour costs and a long term history in agro processing. As a result, cashew processing has developed new mechanised methods and equipment, especially for small and medium scale factories.

These developments have created more options of equipment and suppliers for buyers. The list of suppliers has more than doubled since the first version of the equipment study was published. There is no single homogenous set of machines. Each supplier's machine, service offering and installation package may differ from the others. The market development means that there are many new suppliers who do not have a track record or experience in African countries, but may have machines which are competitive and appropriate for African processors. Research of the offerings, knowing the supplier and a careful procurement strategy have never been more important.

2. Market Structure

It is important for processors or investors who are intent on building new factories or upgrading or replacing existing machines, to understand how the cashew processing equipment market works. The cashew processing equipment market is changing and developing. As mentioned above, new entrants, new technology and new investors in cashew processing have changed the processing equipment market and the machines produced. Manual processing still plays a part, but mainly in small units and in pre-process units where, for example, shelling is done before the nuts are sent for peeling and grading at the main plant.

However, the vast majority of cashew processing plants throughout the world are semi-mechanised, with machines for processing linked together in a production line, and product moved from one section to the next manually or by conveyor. There are a handful of fully-mechanised or continuous process plants where conveying of the product as well as the process itself is conducted by machines supervised by a few workers. These plants are usually large scale. A rough guide for full mechanisation is that capacity of RCN to be processed should be a minimum of 10,000 tonnes per annum. For semi-mechanised or mixed manual/mechanised plants, there are a range of machines which can be efficiently utilised for capacity as low as 1,200 tonnes p.a., although that level is not ideal. There are also small scale machines (e.g. standalone low capacity shelling machines or the “mini fabrica” systems found in Brazil) which can be used in factories with capacities as low as 500 tonnes per annum.

Changes in the market structure have been influenced by a range of factors related to the product market as well as the processing machine market. These are: -

Factor	Impact
Rising labour costs especially in India and Vietnam.	More development of machines to reduce the labour needs of a factory
Food Safety demands from buyers and the introduction of certified quality management systems.	<p>Mechanised plants are easier to manage from a food safety point of view, which looks for consistent, predictable production.</p> <p>As quality management systems have been introduced, cashew kernels buyers found the need to audit and approve the processing plants. From their point of view, larger plants are better as the cost of audit, approval and monitoring is reduced. Larger factories mean more mechanisation.</p> <p>Essential elements of food safety are pest control, microbiological control, chemical residue compliance, foreign matter control and control of harmful moulds and other pathogens. There are machines and technology which offer solutions for each of these.</p>
Consolidation in Vietnam	<p>Vietnam is the largest importer of RCN and the largest exporter of cashew kernels. The consolidation of processing in Vietnam has meant that the trend has been toward larger, more mechanised factories. These factories need machines which are effective and have high capacity. This has caused the Vietnamese processing machine manufacturers to develop more efficient, high capacity machines which are now available to buyers in Africa.</p> <p>At the same time, there are many smaller factories in Vietnam often feeding into the large factories. This has led to a parallel development of processing machines which can stand alone at a lower capacity range.</p> <p>This factor influenced the Vietnamese machine manufacturers who took the lead from Italian manufacturer, Oltremare, the original supplier of large-scale mechanised cashew processing solutions.</p>

Factor	Impact
Expansion in India	<p>The fast development of cashew consumption in India centred on the large northern urban centres, the diversification in the cashew-growing area and, above all, the increased dependence on imported RCN, which meant that it was no longer necessary to locate processing close to traditional growing regions in South India. Processing plants are now located, for various reasons, throughout India. Most of these factories are medium scale and located in areas without traditional processing skills and relatively high cost of labour.</p> <p>In response to the new demand, agro machine manufacturers began developing cashew processing machines suited to medium scale factories. Throughout northern India today, there are manufacturers offering a wide range of machines. These machines often have their own specific design features or innovations.</p>
Innovation and Technological development	<p>Positive developments in peeling and shelling machines have been a factor in recent years. The development of shelling machines of high capacity with continuous flow, low breakage and improved shell/kernel separation has been a feature of the market. Peeling machines too have improved in capacity, breakage and peeling success rates.</p>

Factor	Impact
<p>Competition</p>	<p>Indian factories initially imported machines from Vietnam and, to some extent, they still do. However, the exposure to Vietnamese machines and the opportunity to compete stimulated many new machinery businesses to develop in India. Vietnam still leads the market in shelling and peeling, but India is catching up as the demand of Indian factories for new machines and innovation increases.</p> <p>The entry of China into the market with more generic sorting and grading machines (e.g. colour sorters and calibrators) has been followed by an increase in the availability of custom-built cashew processing machines. This competition is likely to continue and grow.</p>
<p>Demand and diversification of processing</p>	<p>Cashew demand has increased by 86% since the first Vietnamese-manufactured peeling machines appeared on the market in 2009. These machines were largely based on innovation and design by Oltremare of Italy. The fast growth in demand stimulated further advancement in machines, and new suppliers appeared. The ability and interest of these suppliers to supply to African factories has often been influenced by growth at home, as it is easier and less risky to supply a nearby customer.</p> <p>More recently, processing investment in African countries has become a factor for the processing machinery market. The development of factories in Benin, Mozambique and Côte d'Ivoire have stimulated interest for export in machine-producing countries. It has also stimulated an interest in developing home grown solutions for example in Côte d'Ivoire.</p>

Factor	Impact
Main stream suppliers	<p>The expansion in the processing sector, together with the demand for better quality management systems, has created more interest from mainstream processing machinery manufacturers who previously would not have serviced the cashew sector. This is especially seen in the marketing of sorting and conveyancing equipment by firms in Europe, North America and China.</p> <p>This has created greater competition and, for the first time, made the calculation high cost + long life vs. low cost + shorter life a factor in cashew processing purchasing decisions.</p>

These factors have greatly changed the specialist cashew-processing machine market structure which today looks like this:

Country/Region	Processing machine sector
Vietnam	<ol style="list-style-type: none"> 1. Consolidated into a few manufacturers of innovative machines with interest in export but first loyalty to servicing their existing customers in Vietnam. 2. Prices are mid-range and machine life is moderate. Interest in export is high.
India	<ol style="list-style-type: none"> 1. A few "full project" companies able to deliver a fully-commissioned cashew factory. 2. Many mid-size and small companies producing machines for medium-sized and small factories. 3. Specialist companies producing high tech sorting, packing or peeling machines at high efficiency and cost. 4. Prices ranging from mid-range to low cost. Machine life tends to reflect this. 5. Interest in export is high among the "full project" companies, but often low with others who are occupied in the domestic market.

Country/Region	Processing machine sector
China	<ol style="list-style-type: none"> 1. Low cost, short life generic food processing machines are readily available. These are often produced by large multi-purpose companies making large ranges of equipment for many different applications. 2. Prices and operational life tend to be low. 3. Interest in export is very high.
Europe/USA/ Japan/Korea	<ol style="list-style-type: none"> 1. There is only one specialist machine supplier in Europe – Oltremare. They offer large-scale factories of high quality with long operational life and higher cost. 2. Food processing machine builders who seek to sell their machines for use in the cashew-processing sector. 3. Prices tend to be high but machines have high quality and long operational life. 4. Interest in export is high.
Brazil	<p>Brazil has never been a major exporter of cashew-processing equipment. There are essentially two processes at work in Brazil:</p> <ol style="list-style-type: none"> 1. Processor-developed mechanised solutions in partnership with local engineering firms. These factories are difficult to even visit and the technology is not available to purchase. 2. Small scale and semi-manual factories are present in Brazil. There are a number of mid-size firms that design and produce equipment. This is usually offered as packages depending on the intended capacity. This equipment may be available to buy.

3. What does this mean for a buyer of equipment?

More options for machines and suppliers make the procurement task more difficult, but the greater competition can make results more profitable if right decisions are made. Buying cashew-processing equipment has never been more complex or demanding. Getting the decision right or wrong can have long term implications for the success or failure of the business.

- I. An agreed procurement strategy and business planning is essential for successful procurement in a diverse market (see Guidebook 4).
- II. There are alternatives for processors and investors. Different systems, machines, levels of investment and labour needs, are just some of the factors which need to be considered. In order to make the right decision for the long term, it is important to clearly define the needs of the existing or new factory by making some important decisions or working parameters for scale, level of investment, management skills and target markets. It is important for the procurement team to know their own business and to conduct a needs analysis, taking into account, among others, funding, scale, management ability, labour skill, location, environmental factors and target markets.
- III. Cashew factories now need more space, better and more reliable electrical systems, better ventilation and better design for a logical flow when using processing machines.
- IV. A wide range of processing equipment is available for each stage of the process. Making the right choice of equipment can determine success or failure in the business. Information on the technical factors, servicing, operational life, and commissioning of equipment has become essential. Procurement teams must know the market and conduct effective market research.
- V. The advent of mechanisation means that initial capital needs are higher. It is important to ensure that there is enough funding for the capital investment and working capital, especially in times of high raw material prices.
- VI. The large number and different types of suppliers mean that it is essential that a procurement team know the suppliers well before decision-making. This may involve research, telephone communication or factory visits.
- VII. Reliability and performance depend not only on the initial purchasing choice, but also on the servicing options offered by the supplier or available at the factory location. Even the best machine at the lowest cost is useless if key spare

parts cannot be found. Fact-based evaluation and challenges to manufacturer performance claims are essential in good decision making. It is also essential to assess the skills of maintenance staff and managers on site to handle the new demands placed on them by the advances in processing equipment.

- VIII. As mentioned above in relation to the market structure, the options for supply mean that it is vital to assess the lifetime of the machine in relation to its cost. This is a relatively new issue for the cashew processor. It may not always be that the cheapest machine is the best choice if that machine has a short lifespan. Low cost machines may have an effective lifetime of 3-5 years depending on how they are managed. Higher cost machines, possibly constructed with higher quality materials and higher quality parts like electric motors, may turn out to be better value in the long run. This decision will be influenced by the speed of developments in the technology. It may, for example, be better to buy a low cost, short life machine in a market situation where the technology is likely to improve rapidly.

Some related factors of the performance of machines and the factory as a whole, but which are often overlooked in the procurement process are:

- Ease of cleaning – a key consideration in machine efficiency and food safety.
- Level of noise produced – can impact productivity of workers.
- Space taken up by the machine.
- Contamination – especially with CNSL in shelling.
- Dust produced –possible contaminant of kernels and potential danger to workers.
- Maintenance needs and scheduling.
- Availability of spare parts.

The purpose of the following is to give the procurement team or business planner an initial briefing on cashew-processing equipment

3. Cashew-Processing Equipment

3.1 In-Shell Calibrators

Stage in the process	Calibration of RCN is done at the beginning of the processing process, either before storage or steaming.
What does it do?	<p>The in-shell calibrator removes foreign matter and grades the nuts according to size. Available machines grade the RCN into three, four, five or eight sizes.</p> <p>The most common sizes are 18mm, 20mm, 22mm, and 24mm. RCN size impacts shelling; therefore, processors need to decide on the number of calibres (three, four, five or eight) to facilitate management and building of the shelling section.</p>
Available capacities	A minimum quantity of 200kg is required for a calibrator to function efficiently. Available in-shell calibrator capacities range from 500kg/hour to 3 MT/hour.
Ease of use	A rotating cylinder with screens of different sizes allows RCN to fall through by sizes.
Maintenance	Must be cleaned regularly to remove debris from the screens.
Control	Simple electric motor and rotating cylinder. The speed of the rotation must be monitored and controlled for efficient performance. The quality of the motor and the moving parts will determine the lifespan of the machine.
Suitability for small factories	Some small processing factories do not calibrate RCN. Models suitable for small scale factories are now available, notably in India and Brazil. The use of calibrators ensures efficiency in the processing process. It is essential for mechanical shelling of RCN.
Options	Most calibrators can be used with an elevator and automatic conveyance system.
Scalability	High potential for scaling up calibration capacity for small and medium size factories.

Pay attention to	Electric motor size for the calibrator capacity and its durability
Current suppliers in Africa	Almost all suppliers of the full range of machines will supply to Africa. Oltremare offers a post-harvest handling unit for full preparation.
Other suppliers	Agrotech, Brazil.
Price range (2018)	US\$5,400 - US\$13,800 Full calibration and integrated conveyancing are available e.g. US\$30,000 – US\$40,000 (MK Tech, Vietmold)

Figure 1: In-Shell Calibrators



Source: GIZ/ComCashew; Mekong

3.2 Steam Cookers / Boilers

Stage in the process	After calibration, steaming is the first actual stage of RCN processing.
What does it do?	In most cases RCN are steamed to facilitate cutting, to reduce breakage and to protect workers hands from CNSL. Steaming is a critical stage of RCN processing. Attention must be paid to the duration of steaming, temperature and initial moisture of the nuts.
Available capacities	250kg – 1000 kg
Ease of use	<p>Boilers are loaded and timed. The duration of steaming required depends on RCN quality and the type of boiler. Processors should follow manufacturer's specification on steaming duration, temperature and air pressure.</p> <p>Rotary boilers are more complex to use but require less steaming time and allow for larger batch sizes.</p>
Maintenance	Regular maintenance is required for efficient functioning of the boilers. Rotary boilers fitted with elevators require frequent and higher levels of maintenance.
Control	There are simpler models favoured in India but which require manual control of cooking duration. Rotary boilers are generally more advanced and will have a time control system.
Suitability for small factories	<p>Smaller size cookers can cook 2-2.5 tonnes / day, which may be suitable for smaller factories.</p> <p>Rotary steamers can cook up to 12 tonnes per day but should match the capacity of the factory at shelling and peeling stages.</p>
Options	Rotary or static system.

Scalability	The machines are relatively small and low capacity. Scaling is achieved by adding more machines. Shelling different batches which have been cooked separately will usually not create a problem.
Pay attention to	As always with boilers, careful attention to the lines and pipes is essential. Loss of pressure or temperature will reduce efficiency which may not be obvious until too late in the process. Steam can be dangerous, and workers should be well trained.
Current suppliers in Africa	Vietmold, Cao Thanh Phat (CTP), MK Tech from Vietnam and a range of Indian suppliers.
Other possible suppliers	Other Indian suppliers, Brazilian suppliers for small units (50kg)
Price range (2018)	320kg boiler, non-scalable \$2,500 – \$4,500 >320kg capacity rotary boiler with loader \$6,500 – \$14,500

Figure 2: Steam Cookers / Boilers

African model



Brazilian Mini Factory Boiler



Source: Gayathri Industries; cashewmachines.com, Rami International

3.3 Manual Cutting/Shelling Machines

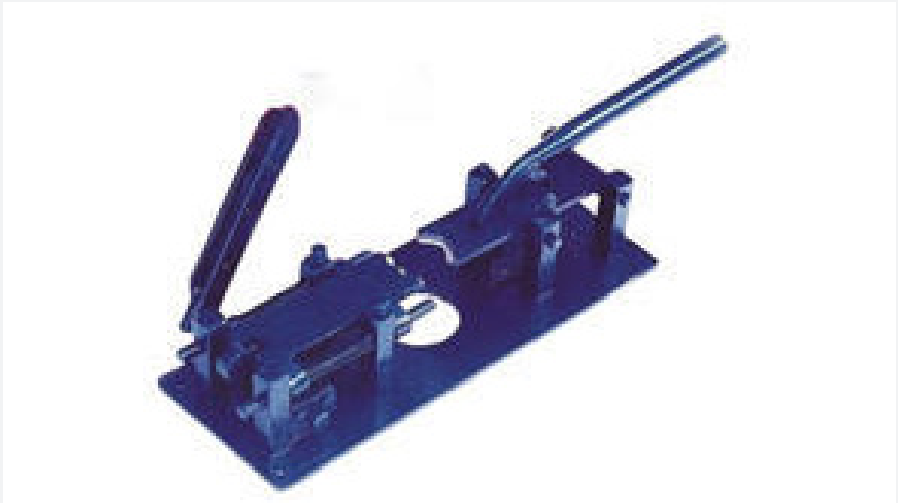
Stage in the process	After steaming and cooling RCN, the shell is removed to obtain the kernels
What does it do?	The shell is cut without affecting the kernel to keep the kernel whole. African factories report 90 % to 95 % of whole kernels are obtained after cutting manually, but others report levels as low as 80%. Low breakage is a key factor in successful cashew processing.
Available capacities	Manual cutting capacity depends on productivity per worker, as well as the number of workers and cutting tools. Currently, the productivity per worker per shift in African factories ranges from 35kg to 40kg.
Ease of use	The Vietnamese two-pedal tables have the best record in cutting high volumes. However, workers in Africa often prefer Indian manual cutting machines. High level training of workers in manual cutting is essential.
Maintenance	Cutting blades must be sharpened and adjusted to suit RCN size. The cutting areas need to be clean for kernel quality and food safety reasons. At this stage, the kernel is obtained from the shell.
Control	Cutting tools are operated by individual workers.
Suitability for small factories	Mostly used in small factories.
Options	Standing, pedal and lever Seated, two pedals Seated, single lever
Scalability	High
Pay attention to	Health implications of workers using pedal and lever
Industry Developments	Shelling machines are among the most significant advances made in cashew processing technology in recent years.
Current suppliers in Africa	Best Engineering, Muskaan, Gayathri.
Other possible suppliers	Brazil Agrotech
Price range (2018)	US\$ 75 - US\$ 400

Figure 3: Manual cutting machines

Brazil



India



Source: GIZ/ComCashew

3.4 Automatic Cutting/Shelling Machines

Stage in the process	After steaming and cooling RCN, the shell is removed to obtain kernels
What does it do?	<p>The shell is cut to obtain the kernel. Automated shelling results in a higher proportion of broken kernels than manual cutting.</p> <p>Most factories today are using a mechanised shelling process.</p>
Available capacities	<ul style="list-style-type: none">• 40kg/hour to 2000kg/hour (Manufacturer claims).• General range 400-1200kg per hour• Shelling machines tend to process just one size and are designed to process that size in harmony with the calibration system. E.g. Vietmold quoted three or four machines as necessary in a high-volume factory.
Ease of use	<ul style="list-style-type: none">• Calibration is a key aspect of successful mechanised shelling. The calibration and cutting processes should be carefully considered together when sourcing equipment. This should include consideration of the uniformity of the available raw material.• Shelling machines must be well-maintained and carefully supervised. The continuous process type of machines are complex and should be only considered for a factory that will have technical expertise on hand and access to good communications for service advice and spare parts.
Maintenance	The machine must be cleaned regularly. Blades should be cleaned and kept sharp. Feeders must be clear and allow flow.
Control	<p>Modern high capacity machines, for example the Oltremare model, are electronically controlled and designed for medium to large scale processing.</p> <p>The lower capacity standalone models often require manual adjustment before nuts are fed into the machine for cutting.</p>

Suitability for small factories	The standalone models e.g. Buddhi type are suitable for small scale factories. The appropriate technical expertise is required for efficient performance and especially maintenance.
Performance	Performance claims for manufacturers range from 85 % to 95 % cut-open RCN in the first shelling cycle. Breakage in the shelling process claims range from 3-5%. Uncut nuts are as low as 5% according to manufacturers. Manufacturers' claims are difficult to substantiate, especially regarding recently launched models.
Options	Manual, semi-mechanical and mechanical cutting.
Scalability	The standalone models and other small machines are scaled out by installing more machines in the same area. The medium and large machines are scaled up through the installation of modern and more efficient machinery, but this can be costly as machines have to be installed for each calibre of cashew nut.
Pay attention to	<ul style="list-style-type: none"> • The number and calibre of the machines in terms of their suitability for the nuts in the region. • The separation of shell and kernel (scooping) including the possible contamination of the kernel by CNSL. • Ensure that you are buying the latest model.
Industry Developments	Higher capacity machines are now available. Improvements in separation and reliability are expected.
Current suppliers in Africa	MK Tech, Vietmold, Gayathri, Buddhi.
Other possible suppliers	Nexgen, CTP, Muskaan.
Price range (2018)	US\$ 1,500 - US\$ 165,000 depending on capacity of machinery. This covers the range from 40kg per hour to 1200 kg per hour. There is also a different labour structure with two workers needed to operate the low scale machine (40kg) and only five for a 1200 kg machine. For large scale operators, a fully-mechanised cutting system would cost US\$400,000-US\$450,000 for a 10,000 RCN tonne capacity plant.

Figure 3: Automatic Cutting / Shelling Machines

Chinese Machines



Buddhi



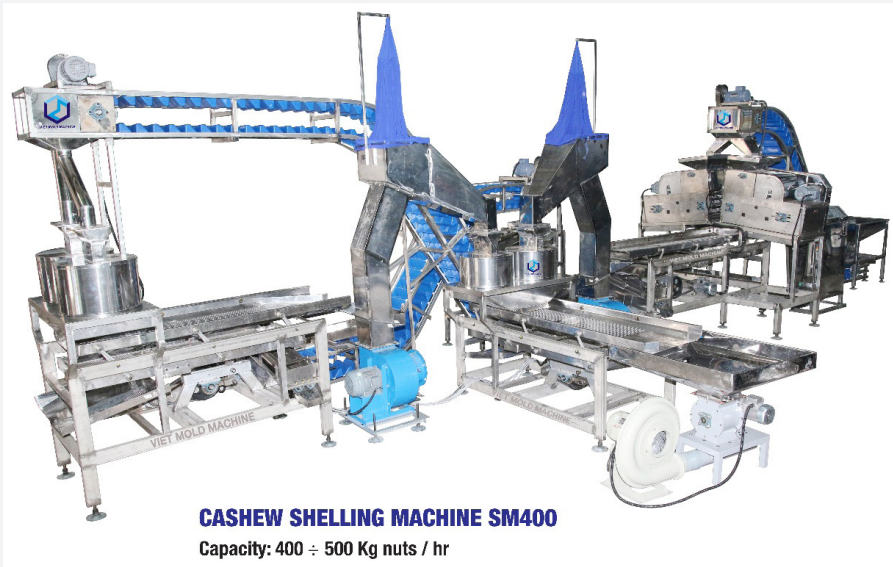
Gayathri



PILONNAGE DE NOIX DE CAJOU, SYSTÈME DE SÉPARATION ET DE SCOOPING/ CASHEW NUT SHELLING, SEPARATING AND SCOOPING SYSTEM



Vietmold



Sources: GIZ/ComCashew, Buddhi Industries, Gayathri Industries; cashewmachines.com; Vietmold

3.5 Oven Dryer

Stage in the process	After cutting of RCN and before peeling
What does it do?	<p>The shelled nuts are heated on trays to make the testa brittle for easy peeling to reduce breakage, thus increasing output. This can be done through a variety of energy sources, including a steam boiler fuelled by cashew nut shells, a heat exchanger, electricity, gas or oil.</p> <p>Even drying to give a homogenous product for the next stage is a key factor in optimum preparation for peeling.</p>
Available capacities	Range from 500kg to 5000kg
Ease of use	A modern dryer fitted with electronic controls and fan air circulation is easy to use. Older models without the air circulation require manual rotation of the trays to prevent scorching of the kernels, and constitute significant risk to the colour of kernels.

Maintenance	Regular cleaning of trays and oven. Testing of control panels for efficient functioning.
Control	Many modern oven dryers have full electronic control. Older types are controlled manually by workers who regulate the timing and temperature. It is important to know RCN quality to set the appropriate drying time.
Suitability for small factories	Range of capacities. At start up, ensure that oven capacity can be increased to dry higher kernel volumes.
Options	<ul style="list-style-type: none"> • Capacity /cost • Control systems • Mechanised or manual rotation
Scalability	The potential for scalability is limited. It is essential to consider the expansion plan and long-term capacity ambition when buying for this section.
Pay attention to	<ul style="list-style-type: none"> • Maintenance • Boiler capacity • Quality of control equipment • Heat circulation in the oven • Quality of trays – ensure compliance with food safety standard
Industry Developments	Higher capacity incorporating drying/cooling tunnels. Reduction in manual handling.
Current suppliers in Africa	Vietmold (SM Range), MK Tech, Gayathri (ASM 600).
Other possible suppliers	Check mid-size Indian suppliers.
Price range (2018)	1.2 tonnes US\$10,000 -\$15,000. fully electric steel construction: US\$ 39,000

Figure 5: Oven Dryers

Ghana



Vietnam



Source: GIZ/ComCashew

3.6 Thermal Shock/Humidifier

Stage in the process	After drying, in preparation for peeling
What does it do?	This is an option found in African factories - After drying, kernels are cooled and treated with a short burst of hot steam in a thermal shock chamber to loosen the testa.
Available capacities	Often made on site. Manufacturers offer machines which render this operation obsolete.
Ease of use	The kernel is placed on trays and wheeled into the thermal shock chamber for cooling over a period of time.
Maintenance	Regular cleaning of thermal shock chamber and checking of steam outlets.
Control	The cooling time is manually controlled, and water quality is tested for compliance with food safety guidelines.
Suitability for small factories	High
Options	Modern Thermal shock chambers combined with drying ovens
Scalability	The potential for scalability is limited. The decision of thermal shock chamber size should consider expansion plans.
Pay attention to	Water quality Temperature of the thermal shock chamber
Industry Developments	Equipment suppliers offer improved humidifiers. This product is best built locally, for example by Technoserve.
Current suppliers in Africa	No suppliers but advice is available from African Cashew Alliance and Technoserve.
Other possible suppliers	None
Price range (2018)	US\$ 1,000 - US\$ 3,000 depending on capacity.

Figure 6: Thermal Shock Chamber



Tray Trolley at Anatrans, Burkina Faso



Source: GIZ/ComCashew

3.7 Peeling Machines

Stage in the process	After shelling and drying to loosen the testa
What does it do?	<p>The kernels are peeled by rotating springs and /or brushes which loosen the testa. Compressed air is used to separate the testa from the kernel. An air compressor is necessary to go with the peeling machine.</p> <p>Peeling machines have seen significant advancement in the past couple of years. In particular, the greater use of compressed air has decreased the number of unpeeled kernels on each run.</p>
Available capacities	<p>Manufacturers claim machinery performance up to 500kg/ hour. In some cases, reducing proportions of the kernels must be run through the machine two or three times with some kernels being eventually sent for manual finishing.</p> <p>Breakage varies, depending on RCN quality, machine management and machine efficiency.</p>
Ease of use	<p>The effective use of peeling machines requires appropriate technical knowledge about the operation and maintenance of the machine. It is important to understand the factors which influence the effective performance of the peeling machine in your factory.</p> <p>It is very important to obtain the manufacturer's instruction manual published in a language understood by maintenance staff.</p>
Maintenance	Cleaning and regular adjustment and maintenance of the peeling machine is essential. Depending on the capacity used, manufacturers suggest full maintenance twice per annum.
Control	Electronic control panel.
Suitability for small factories	<p>Unsuitable for small factories.</p> <p>The Agrotech small-scale machine might be a better solution.</p>

Options	Manual peeling is the only other option. During a forum on processing at SIETTA 2018, experts agreed that mechanisation in peeling would be their priority if they had to choose between the sections.
Scalability	Peeling machines should only be introduced after workers have undergone training in manual peeling. Currently, the proportion of manual peeling in mechanised systems in Africa is estimated at 20-40 %. This level can be reduced to 0% by increasing peeling machinery efficiencies.
Pay attention to	<p>Some manufacturers are still offering older models. Take care to ensure that you purchase the latest model.</p> <p>The most significant issue according to processors is the number of unpeeled kernels. These kernels must be manually peeled and can increase breakage. The unpeeled kernels may relate to the quality – especially post-harvest handling of the RCN – as much as to the operation of the peeling machine. Manufacturers claim peeling success rates at 80-95%, but reports from factories suggest that this may in fact be as low as 70%. Breakage is claimed to be 4-8% which appears in line with processors' experience.</p>
Industry Developments	Processors are installing the new generation of improved machines.
Current suppliers in Africa	Oltremare, Vietmold, MK Tech., Gayathri, Best Engineering, My An.
Other possible suppliers	Smaller scale from Indian manufacturers – see listing of suppliers.
Price range (2018)	<p>Peeling machine US\$13,000 – \$25,000</p> <p>Peeling machines with compressor US\$25,000 to US\$50,000</p> <p>Small scale machine US\$3300 (50-60kg per hr)</p>

Figure 7: Automated Peeler



NOYAU SYSTÈME ÉPLUCHAGE/ KERNEL PEELING SYSTEM





Source: Gayathri Industries; cashewmachines.com; Oltremare

3.8 Cashew Wholes Grading Machines

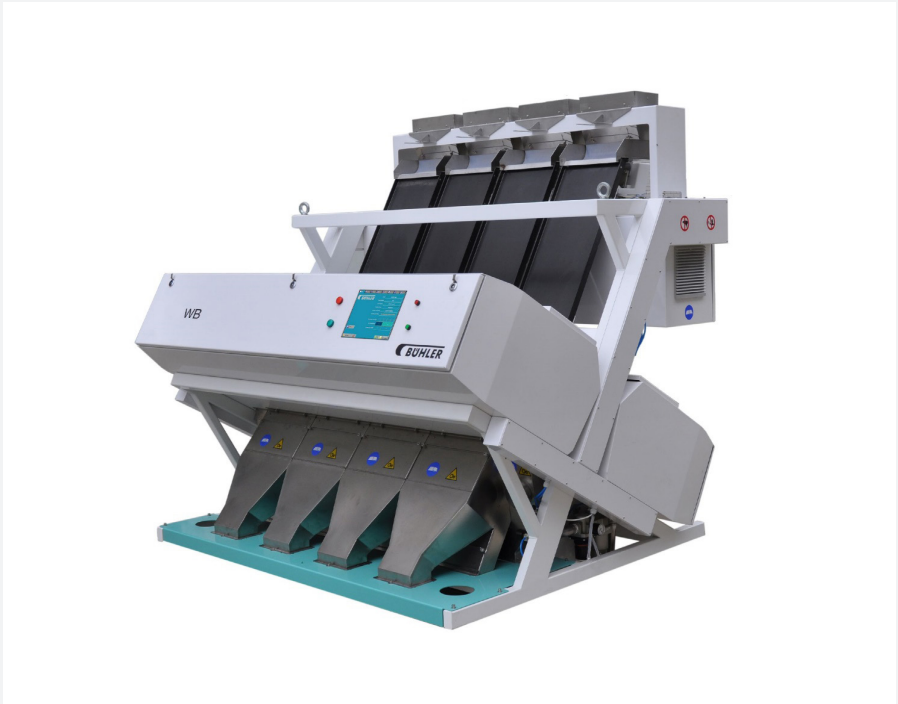
Stage in the processing process	After peeling, the kernels are sorted into the different grades by colour and by size
What does it do?	<p>This area has become more complex in recent years. Most new and modern factories are using a type of colour sorter to classify according to WW, SW, SSW and DW. This has come about due to the availability of more cost competitive colour sorters. It is also a result of the larger scale of factories now. Modern colour sorters may use imaging technology, X-ray and laser.</p> <p>The second part of the process is the grading of the kernels according to size, which is usually a mechanical process.</p>
Available capacities	<p>Colour sorters can grade up to 1 tonne per hour.</p> <p>Mechanical size graders 80 kg/hour - 100 kg/hour</p>

Ease of use	Grading is mostly done manually. In mechanised grading systems, processors have consistently experienced problems with poor grading and breakage of kernels. More research is required to improve the efficiency of whole kernel grading machinery.
Maintenance	Electronic machines require regular and high-level maintenance.
Control	Electronic control panels
Suitability for small factories	Unsuitable for small factories due to high costs and the high kernel volumes required for the machine. Technical complication of the machine requires specialised management expertise.
Options	Manual grading is the only other option.
Scalability	None scalable in small and medium factory systems
Pay attention to	Exaggerated manufacturer claims of machine performance
Industry Developments	<p>Processors are demanding greater accuracy and faster processing from colour sorters. These factors are currently related to the price of the machine with high levels of accuracy and capacity available from high quality /cost manufacturers.</p> <p>There are developments from manufacturers such as Nanopix of India, with sorters which learn and improve identification as they are used using artificial intelligence.</p>
Current suppliers in Africa	Oltremare, Buhler, China Meyer, Nanopix.
Other possible suppliers	Cao Thanh Phat (CTP), Viet Mold, MK Tech
Price range (2018)	<p>Colour sorters US\$16,000 -US\$65000</p> <p>Mechanical sorters US\$3,200 - US\$15,000</p>

Figure 8: Size Grading Machine



Size sorter



Source: Gayathri Industries; cashewmachines.com; Buhler

The KF Model cashew kernel grading machine



The KM Model cashew shell and kernel sorter



Source: MEYER Optoelectronic Technology Inc.

3.9 Grading Machines for Broken Cashew Kernels

Stage in the processing process	After peeling, the broken kernels are graded
What does it do?	The grading machine sorts all broken kernels by size according to international quality standards.
Available capacities	Up to 150 kg/hr.
Ease of use	The broken kernels are spread on grading sieves to grade the broken kernels, consistent with international quality standards and buyer specifications.
Maintenance	Regular cleaning of grading sieves.
Control	Electronic control panel.
Suitability for small factories	High
Options	Manual grading
Scalability	High potential for scalability. Incorporate scalability at the planning stage of the factory.
Pay attention to	Machine quality and reliability. Compliance with food safety standards.
Industry Developments	Continuous research for small scale factories
Current suppliers in Africa	Best Engineering, Gayathri, Vietmold, Muskaan
Other possible suppliers	Many suppliers offer this machine with price ranges defined by capacity.
Price range (2018)	US\$2,400 - US\$3,800 A full continuous process grading system with conveyancing ranges US\$25,000 – 30,000 for a system 800 – 1000 kg per hour.

Figure 9: Piece Kernel Separators



Source: GIZ/ComCashew

3.10 Vacuum packaging machines

Stage in the process	The final stage of cashew processing is vacuum packaging
What does it do?	<p>Vacuum packing machines are generally not specifically designed for the cashew industry. Therefore, the range of suppliers is wide with specialist packing machine companies offering standalone solutions, and specialist cashew equipment companies offering integrated packaging machines. In general, packaging machines can be bought as standalone units as matching them to the rest of the process is straightforward.</p> <p>The kernels are fed into a vacuum packaging machine, either manually or by conveyor, with weight check and metal detector. This machine aerates and cleans the kernels. It fills and weighs the kernels into pouches. The pouches are then vacuum sealed and stored, ready for shipment either packed in cartons to be marked prior to shipment or simply in the vacuum packs ready for final packing.</p>
Available capacities	Capacity is only an issue for the largest factories, with machines generally capable of exceeding 2 MT/hour (25,000 tonne RCN equivalent per annum)
Ease of use	The machines are relatively straightforward to use in a semi-mechanised process, but may be more complex if a mechanised or automatic feeding system is used.
Maintenance	Daily cleaning and regular testing of the weighing scales. The packaged products should be tested for integrity of seals, pressure of the vacuum and quality of the gas backflush.
Control	Direct electronic control panels to set weight, vacuum and back flush.
Suitability for small factories	If a small processor is targeting export markets, then a packaging machine is needed even if the capacity of the machine may be well beyond the volume processed in the factory.
Options	Tin packaging, especially demanded by buyers in the Gulf States.
Scalability	The packing machine is unlikely to be a barrier to expansion due to capacity.

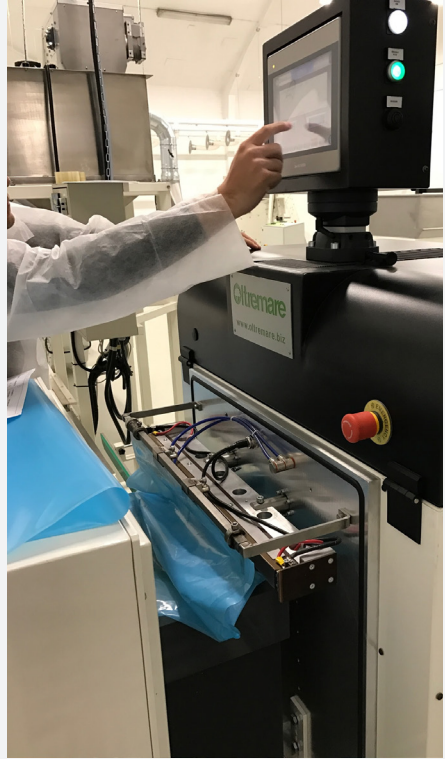
Pay attention to	<p>Integrity of the vacuum seal.</p> <p>Even and effective gas backflush.</p> <p>Availability of pouches, delivery time and cost of pouches.</p>
Industry Developments	<p>Developments in recent years have been few, given the already advanced nature of this section. The main advances have been in the feeding and conveying of the kernels to the machines and changes in the gases used.</p>
Current suppliers in Africa	<p>Oltremare, Multivac, Sepack, Libra MK Tech.</p>
Other possible suppliers	<p>High quality machines from Europe at higher cost.</p>
Price range (2015)	<p>Vacuum packer with conveyor and screen circa US\$30,000</p> <p>Small scale packer: US\$3,300</p> <p>Metal detector unit: US\$3,000 – US\$16,000 depending on quality and capacity.</p>

Figure 10: Vacuum Packing Machine

Ghana



Sources: GIZ/ComCashew, Gayathri Industries; cashewmachines.com



Source: NCP; Oltremare

4.0 LIST OF EQUIPMENT SUPPLIERS

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
1	Bosch Packaging Technology	Nigeria Covers West Africa	Francis.Omoniyi@bosch.com	Tel: +2341 4489092 Mob: +2348090490923	www.boschpackaging.com	Packaging equipment	Francis Omoniyi
2	CENTRE DE DEMONSTRATION ET DE TECHNOLOGIE (CDT)	Cote D'Ivoire	coulsem.cdt@gmail.com	Tel: (+225) 21 35 38 04	www.cdt.ci	Works with Vietnamese and manufactures small scale machines	Mr. Ahmed Coulibaly
3	COTE D'IVOIRE ENGINEERING	Cote D'Ivoire	info@c-engineering.com engineering@avisio.d	Tel: +225 21 27 31 16	http://www.c-engineering.com/	Developing manual and small scale solutions	
4	Cottage Italia Industries Gh. Ltd.	Ghana		+233302812357 / +233244926724	www.cottage-industries-italia.com	Packing Materials and Packing Machines Ovens for cashew roasting; Press; juice extractors.	
5	ENTREPRISE METALLURGIQUE IVOIRIENNE	Cote D'Ivoire	emisar12005@yahoo.fr	Tel :+225 21 24 70 48	No web site active	Metal works and steel construction	

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
6	Gratis Foundation	Ghana	gratis@igmail.com	+233022204243 +233022207610	http://www.gratisghana.com	A leader in the designing, manufacturing, and selling of precision agro, food processing and sanitation equipment including palm oil processing, fruit juice extractors and other food processing machines.	Kofi Debrah Caroline Istaka, Marketing Manager
7	Huhtamaki South Africa	RSA		+27 - (0) 11 730 6300	http://www2.huhtamaki.com/	Packaging solutions	William Rigby
8	INSTITUT IVOIRENNE DE TECHNOLOGIE TROPICAL (IZT)	Cote D'ivoire	support@izt.ci angate.stephane@izt.ci	Tel: +225 56 977 999 +225 56 077 799	www.izt.ci	Cashew Processing Equipment. Simple solutions for smaller scale factories	Diarra Umar, Manager
9	Institut National Polytechnique Felix Houphouet Boigny	Cote D'ivoire	sisoko.amara@yahoo.fr info@inphb.edu.ci		www.inphb.ci	Research and development of technology and rehabilitation of infrastructure	Amara Sissoko
10	Mecanique General Centrifugeuse	Cote D'ivoire		Tel: +225 1 07 46 1215	https://www.facebook.com/pages/category/Industrial-Company/M%C3%A9canique-G%C3%A9n%C3%A9rale-Centrifugeuse-1319829054761550/	Engineering works and machines	Obodji Innocent, Chef d'Atelier

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
11	PRECIX	Cote D'Ivoire	mecanique@precix-sarl.ci	Tel: +225 23 50 30 38	www/precix-sarl.co	Factory and machine construction	commercial@precix-sarl.ci
12	Quantum Technology (Satake)	RSA	dave@quantumtechnology.co.za	+27833255945	http://www.satake-europe.com/	Colour Sorter for all flowing products.	Dave Neilson
13	Rivalia Sarl	Morocco	mestarrav@gmail.com	+212 5233-13838		Fruit processing and juice machines suitable for cashew apples	
14	SEM ENTREPRISE	Cote D'Ivoire		Tel: +225 21 36 03 76	www.sementerprises.cd	Steel construction and production line assembly	
15	Société des Travaux, d'ingénierie et de Consultance (SOTIC)	Cote D'Ivoire	bakayoko@sotic.ci	+225 22 01 49 16	www.sotic.ci/ email: info@sotic.ci	Cashew equipment full process	Bakayoko Aboutakal/DG
16	Technica	Lebanon	technica@technicaintl.com	+961498.2224	www.technicaintl.com	Transportation and automation solutions	
17	Apiagro Ltda	Brazil	apiagro@apiagro.com.br apiagroventas@gmail.com	+558934224766 +558934224830 +558934224403	http://www.apiagro.com.br	Compressor, Centrifuge, Juice extraction, compressor, filter	
18	ARV Alricande	Brazil	comercial@arv.com.br	+551125425010	http://www.arv.com.br/	Packaging and vacuum equipment, scales	Arthur Teixeira
19	Atlas Copco	Brazil	ventas.compressores@br.atlascopco.com	+551134788700 +5532741411	http://www.atlascopco.com.br/hrbr/	Compressor	Claudio Barroso
20	Bosch	Brazil	consult_website	+551921031954	http://www.bosch.com.br	Packaging machines	
21	Brapenta	Brazil	comercial@brapenta.com.br	+551156413410	http://www.brapenta.com.br	Metal detectors, X-ray, Check weighing	Fabiana Rocha

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
22	Gil Equipamentos Industriais Ltda	Brazil	celso.tamura@gil.com.br	+55 85 99598300	http://novo.sitegil.wixsite.com/gilingles	Cashew Shelling Machine TECHNOLOGY: CASCAJU DSA-2C is equipment for the opening of the cashew nut through knives, comprising a system of monobloc heads that may be integrated, thus multiplying productivity. Electronics are integrated to the design, providing safety and ergonomics to the operator, preventing contact with moving and cutting parts. TECHNICAL DATA: Dimensions: 1.55 mx 0.75 mx 1.35 m (WxLxH) COMPRESSED AIR UPTAKE: 10 ft ³ / min (cubic feet per minute)	Celso Tamura
						PRODUCTIVITY: Approximately 60 nuts per minute. Weight: 150 kg	

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
23	Grantham Engineering	Brazil	grantham@grantham.com.br	+551147022462 +551146120475	http://www.grantham.com.br/	Continuous Ovens and drying solutions "The floating dryer". The tunnel is modular and can achieve loads of 500 kg/h 750kg/h or 1000 kg/h. The equipment is fully insulated, so heat is reused inside the chambers and requires much less energy during drying.	Valter Lulá
24	Ishida do Brasil Ltda	Brazil	info@ishidaeuropa.com	+551155475778	http://www.ishidajapan.com	Packing, weighing and detection machines	Vereda Filgueiras, De Menezes
25	Johnson Electric material handling	Brazil		Tel: +27 (0)11 452 1415	www.johnsonelectric.com	Conveying and packing Machines	
26	Maspick	Brazil	mas.baldini@maspick.com.br	55 (11) 3246-3666	www.maspick.com	Packing Machine	Eduardo Baldini
27	Mecol - Metalurgica Cobica Ltda	Brazil	mecol@mecol.com.br	+55852813222	http://www.mecol.com.br	Machinery and full line solutions for mini factories, small and medium scale factories.	Osny Monteiro
28	Pearce Industria e Comercio-de-Maquinas	Brazil	pearce@pearce.ind.br	+558532502544	http://www.pearce.ind.br	Full range of equipment for small and manual factories	Osny Monteiro
29	PERFOR	Brazil	vendas@perfor.com.br	+5547 3383 0731	www.perfor.com.br	Weight control & metal detection	Marco Antonio DeCruz
30	PLANALT	Brazil		+55 (16) 39758500			

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
31	Sangati Berga SA	Brazil	sangati.sp@sangatiberga.com.br / roberta@sangatiberga.com.br	55 85 40085000	www.sangatiberga.com.br	Industrial equipment that can be applied in cashew factories for transportation, calibration, food safety, storage and sorting	Roberta Vinticinque
32	Selgron Satak Industrial Ltda	Brazil	selgron@selgron.com.br	+55472117777	http://www.selgron.com.br	Packaging machines, color sorter	Mario Santes
33	Selovac	Brazil	selovac@selovac.com.br	+551156435599	http://www.selovac.com.br/	Packing machines	Carlos Frederico de Melo
34	TCE Pak	Brazil	diretor@tcepak.com.br	+55112436706	http://www.tcepak.com.br/	Packaging machines	Antonio Augusto Filho
35	Tetralon	Brazil	marcio.magoni@tetralon.com.br	Tel:+55 (11) 4081-7000 Fax +55 (11) 4081 7100	http://www.tetralon.com.br/	Import agent: pumps	Erik de Almeida Costa
36	WEG -Agents throughout Brazil see website	Brazil	CTC@weg.net	Tel: 55 85 3261 0094 Fax: 55 85 3261 0286	http://www.weg.net	Electric motors	João Paulo Silva
37	An-Viet International Co	Vietnam	ancoviet@gmail.com	Tel: 84-38-445601 Fax: 84-38-445600 Skype lotus.duong +84 862 630 7		All machines	Ms. Julia Nguyen and Nguyen Trong Tuan
38	Blue Lantern	Vietnam	sammy@blue.lantern.vn vien@blue.lantern.vn	+84839848847	http://www.blue.lantern.vn/	All types of machines	Ms Candy Nguyen
58	Cao Phat Co	Vietnam	sangtran@caophat.com.vn	+848 36 10 1447	www.caophat.com.vn	Range of machines as trader and specialist shelling machine	Sang Tran

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
59	Cao Thanh Phat Co. Ltd.	Vietnam	GM@ctpv.vn sales@ctpv.vn alex@ctpv.vn	+8486652292	http://www.ctpv.vn	Full range	Mr. Nguyen Cong Kinh (John Nguyen), Director. Mobile phone: +84 984 300 509 Alex Tran
60	Dai ha Viet Co Ltd	Vietnam	sales.daihaviet@gmail.com	Tel: +84 862 711 393 – Mob: +84 908 866 390	www.vietcashewmachine.com	Full range. Also offers consulting and installation service.	Ms. Hoang Anh
61	Hefei Yijiete Optoelectronic Technology Co	China	cailouis1986@yahoo.com	Tel +865513841262	http://www.yjtoe.com/	Colour Sorter	Mr. Louis Cai
62	MEYER OPTOELECTRONIC TECHNOLOGY INC.	China	sales@meyer-corp.com joey@meyer-corp.com	Tel sales: +86 1826 97 99 808 Fax: +86 551 653 25618	http://www.meyer-corp.com	Sorting machines	Joey Lao, Sales Manager +86 18269799808
63	MkTech Co Ltd Also trades as Vietnam Cashew Machinery Group	Vietnam	sales@mktech.com.vn sales.mktech@gmail.com	Tel: +84-08-22404445, +840837262687; Fax: +840837262687	www.mktech.vn cashewmachine.com.vn	www. All Machines and full lines	Dan Van Tuyen (Technical Manager; +84907668850) Skype: dtvuyen
64	My Anh An Trading Co Ltd. Part of Vietnam Cashew Machine Group	Vietnam	myanhancashew@gmail.com jpierre.to@gmail.com	Tel: +84 854 284 587	www.Myanhan.com	All machines and full lines	Jean Pierre To +84 8888 39039
65	Phuc Thang Co. Ltd	Vietnam	phucthangco91@gmail.com	+ 84854315442		Dryer	Mr. Nguyen Tuan Vu Khanh (Director; +84903863628)

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
66	Shanghai Yuli Environment Tech. Co	China	zengjie.wu@outlook.com	Tel: +86 15 201 934 369		Mid size company offering a range of machines for all kinds of applications.	Wu Zengjie
67	Si Chau Industrial Co	China	sales@scuic.com	+862886283912 +862886289173	http://www.scuic.com	Shelling Machine	Michael Young Anthony Wang
68	Son Viet	Vietnam	sonviet09@yahoo.com.vn pithanh@sonvietmachines.com.vn thanhbncsonviet@yahoo.com.vn	+84838905719 +84838660244 +84862763105 +84984439233	http://www.sonvietmachines.com.vn	All cashew machines	Mr. Pham Nhu Thanh (Director; +84918077948)
69	TNHH SX - TM Long Tin Viet Trademarks and Trading Company	Vietnam		Tel: +84 8583285 Fax: +84 9622760		All machines	Mr Huynh Le Can
70	Trung Tam Nghiem cuu Thiet bi & GS Tran Doan Son - HCM City University of Technology	Vietnam	hcmut.net@hcmut.edu.vn	Tel: +84 8662632		Cashew technology development and consulting	Mr Thanh and Mr Sang
71	TTO Industrial Equipment Manufacture Co., LTD	Vietnam	ttquynh07@gmail.com	+84 167 2868 997	www.maychiebienhatdieu.com	Cashew and coffee machines Coffee roasting machines and cashew processing machine	Mr Pham Nhu Thanh
72	Viet Mold Machine Co. Ltd	Vietnam	khioinguyen@vietmoldmachine.com vmmpro@gmail.com admin@vietmoldmachine.com	+84862537904	http://www.vietmoldmachine.com	Full lines and individual machines	Mr Nguyen Xuan Khol (Director; +84909020010)

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
73	Vietnam Cashew Machine Group See MKTech	Vietnam	See MKTech		www.vietnamcashewmachine.com.vn		
74	Viscon	Vietnam	phuthurcompany@gmail.com hohuuphucuong@gmail.com triphamphu@gmail.com	+84903704734	http://www.viscon.com.vn/	Peeling and shelling machines	Mr. Pham Phu Tri (Director; +84903704734) Mr. Ho Huu Phu Cuong (+84909352549)
59	Vuthanh Machinery	Vietnam	vuthanhmachinery@gmail.com	+84 914 898 748		CNSL extraction, shelling and peeling machines.	
60	Xi nghiep co khi chinh xaoci nghiep co khi chinh.xac = Hanoi Mechanical	Vietnam	nongnhan2707@yahoo.com.vn ckc277@vnn.vn	(84) 24.38584416 / 38584354/38584475 - Fax: (84) 24.38583268	http://www.hameco.com.vn	Machine tools for Cashew technology all machines	Mr Nguyen Huu Nhan Mob: 0903 745908
61	Zhengzhou Amisy Trading Co. Ltd.	China	nushellingmachine@gmail.com info@shellingmachine.com	+86-371-65903478	http://www.shellingmachine.com/	Cashew Nut Processing Plant consists of cashew nut grading machine, cashew nut steaming machine, cashew nut shelling machine, cashew shell and kernel separator Cashew nut processing plant, cashew peeling machine and cashew nut roasting machine.	Lana Chen
62	Zhengzhou Sunshine Machinery Co., Ltd.	China	Sales@OILMILL-China.com	Tel:86-371-55397618 Mobile/LINE/Wechat/Weiber/ WhatsApp: 8613526701508	http://www.oilmill-china.com	Non specialist with a range of machines for small and medium scale factories	Ms. Sasha

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
60	Aurobag (Automated Packaging Systems Ltd.)	Germany Africa agent in RSA	sales@bizerba.co.za	+27 11 745 1940	www.bizerba.com	Packaging	Gerd Kammerer (Germany) sales@bizerba.co.za
61	BEST (Belgian Electronic Sorting Technology)	Belgium	info@bestsorting.com / TOMRA	+3216396396 +5519815567929	http://www.bestsorting.com	Laser sorting machines	Karel Strubbe
62	Bosch	Germany	Krug Mathias.Mathias.Krug@de.bosch.com	+49 711 400 40990	www.bosch.com	Packaging and transportation in factory solutions. Motors and engineering.	Krug Mathias
63	Brovind	Italy	barisone@brovind.com	+39.0773.87439	www.brovind.com	Roasting	Fabrizio Barisone
64	Buhler Sortex	Switzerland	raphael.knucker@buhlergroup.com	+41719551111	http://www.buhlergroup.com	Optical sorting equipment of high efficiency	Raphael Knucker
65	Cablevey	USA	info@cimbria.co.ke	+1 (641) 673-8451	https://cablevey.com/	Conveyors and transit	
66	Cavama Packing Group	Italy	Marketing@cavamagroup.com	(+39) 0163/829111	www.cavama.com	Packaging	Gianluigi Ferri
67	Cimbria	Denmark Kenya	info@cimbria.co.ke	+254 709 459 000	www.cimbria.com	High quality cleaning, processing and transportation systems	Steen Anderson, Managing Director
68	Cloud Packing Equipment, LLC	USA	mwerner@cloudps.com	+1 847.390.9410	www.cloudpeg.com	Packaging	Mike Werner
69	CPM Wolverine Proctor	UK	d.harvey@wolverineproctor.co.uk	+44 (0)1355 573350	www.wolverineproctor.co.uk	Drying and roasting	Sales Manager: Tracy Watson Douglas Harvey
70	Duyvis Weiner	Netherlands		+31 75 6 126 126	www.duyvisweiner.com	Cocoa Equipment	

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
71	Foodmasters Freiberg	Germany	harold.meier@foodmasters-freiberg.com, gunter.haeuser@foodmasters-freiberg.com, juergeb.fischer@foodmasters-freiberg.com, info@foodmasters-freiberg.com	+49-7141-974033-0	www.foodmaster-freiberg.com	Roasting	Juergen Fischer
72	Gemmer Maschinenbau GmbH & Co KG	Germany	henrik.gemmer@gemmer-group.com	+49(0)47 91-9 66 44-0	www.gemmer-gruppe.de	Processing technology	Henrik Gemmer
73	Heat and Control	USA	mikem@heatandcontrol.com	+1717 556 5820	www.heatandcontrol.com	metal detection and roasting	Mike McBeth
74	Helms Technologie	Germany	Ulrike.Helms@helms-technologie.de	Tel: + 49 (0) 4102-2225-0	helms-technologie.de	Packaging machines	Ulrike Helms, Head of Project Management
75	Insort SmbH	Austria	office@insort.at	+43 3115 21 786	www.insort.at	High tech sorting machines with cameras	
76	Invicta Vibrators	England	sales@invictavibrators.co.uk	+441476566301	www.invictavibrators.co.uk	Vibrators	Veleda Figueiras De Menezes
77	Key Technology	Netherlands	investor.info@key.net	: +32 496 27 15 02	http://www.key.net	Inspection, process and transit technology	Gregory Gouters Gert Poesen
78	KHS	Germany	aler.macewan@khs.com	+49 231 569-10000	www.khs.com	Filling machines: cashew apple processing	Hubert Schiffer
79	Krones	Germany	thilo.steindorf@krones.com		www.krones.com	Filling machines: cashew apple processing	Sales Director: Thilo Steindorf
80	LMC Lewis Carter Manufacturing Co.	USA	lmc@lmcarter.com	+1 229 524 2197	www.lmcarter.com	automatic separators	L. Marcus Carter III

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
81	Maseto Technologies	Spain	info@maseto.com	+34 965 930 077	http://www.maseto.com/	Many processing lines and machines.	
82	Multiscan Technologies	Spain	sales@multiscan.eu	+34965331831	http://www.multiscan.eu/en/		
83	Multivac	Africa	borhen.bibani@multivac.fr alex.becker@multivacsa.com bernard.leveau@multivac.fr	Southern Africa +27163405400 East & West Africa +216 71 963 963	http://www.multivac.com/	Packing machines	Alex Becker Southern Africa Borhen Bibani East Adelrahim Thani. Bernard Leveau
84	NEUHAUS NEOTEC Maschinen- und Anlagenbau GmbH	Germany	info@neuhaus-neotec.de Henkel@neuhaus-neotec.de	+49 4221 859 -0	www.neuhausneotec.de	Specialised on Coffee Processing as well as Nuts Processing Hot Air Roasters, Grinders, Conveyors, Storage Silos	Mr. Lars Henkel
85	Nuts Cleaning & Packaging B.V.	Netherlands	j.nieuwenhuizen@ncp-group.nl info@ncp-group.nl	+31 (0)183 71 24 62	https://www.ncp-group.nl/	Nut Cleaning and packaging machines	Mr. Joren Nieuwenhuizen
86	Oltremare	Italy	info@oltremare.biz olcashew@oltremare.biz stefano.masari@oltremare.biz	+390512988311 +84908547850	http://www.oltremare.biz	Full range of equipment with mechanisation and production line processes. The original equipment manufacturer.	Ricardo Fonteles S.Mazzotta Trong Tuan Stefano Masari
87	Optimum Sorting	Belgium (HQ) Netherlands USA	info@optimum-sorting.com info-usa@optimum-sorting.com	+32 (0)11 71 80 20 (Belgium) +31 (0)402 354 760 (Netherlands) +1 (720)990-9687 (USA)	www.optimum-sorting.com	High tech sorting machines	
88	Pattyn Packing Lines NV	Belgium	info@pattyn.com	+32 50 450 480	https://www.pattyn.com/	Packing machines	

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
89	Quantum Technology	Europe	dave@quantumtechnology.co.za	+27 83 325 5945	http://www.satake-europe.com	Colour Sorters for all free flowing granular products. Example:-	Contact for Colour Sorter machine enquires – Dave Neilson
90	Revtech	France	revtech@revtech.fr	+33 4 75 60 16 33	http://www.revtech-process-systems.com/index.php/en/	Macadamia kernels Pecan kernels. Groundnuts. Almond kernels. White and Yellow Maize. Onion Seed. Carrot Seed. Previously Satake installed machines to sort Cashews in Mozambique (Before the war).	Large factory process systems
91	Satake Europe		cassie.hughes@satake-europe.com		www.satake-europe.com	Sorting Machines	Cassie Hughes
92	Senzani	Italy	info@senzani.com senzani.com technical@senzani.com	+39 0546 624011	www.senzani.com	Packaging	Vittorio Tonazzi
93	Simaco	France	simaco@simaco.fr	+33 (0)3 87 78 25 14	www.somaco.fr	Cashew apple processing	Jean-Yves HEUSSER
94	Tomma Sorting Food	Belgium	food@tomma.com Bellemans@tomma.com	[Marijke] +32 16 396 396	www.tomma.com/food	Sorting solutions	Karel Strubbe
95	Ventilex	Netherlands	sales.ventilex@imitech.com	+31 88-988 1500	www.imtechventilex.com	Sterilization solution, chemical and radiation free.	
96	Wisys Precision Sorting	Turkey	info@visystr.com	+90 212 876 90 36	www.wisys.com.tr	Specialist's sorting equipment for fruits and nuts	

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
97	VQP Group	Netherlands	m.mulder@vacpack.com	+31 183 700 137	http://www.vacqpack.com	Specialised packing in bulk bags	Marcel Mulder, Sales manager
98	Zed5	UK	zed_five@zedfive.net ; zedfive@zedfive.net	+44 792 456 3997	www.zedfive.net	Innovation weighing systems	Valter Rosa
99	3 Desire Cashew	India	info@3desirecashew.com	+91 90993 37500, +91 261-4002546	http://3desirecashew.company.weiku.com/	Established in 2008, as traders & Suppliers of Cashew Dryer, Cashew Boiler (Cashew Steam Cooker), Cashew Auto shelling machine, Cashew Cutting Table, Cashew Grading Machine. Our Cashew Nut Processing Plant located in KIM near Surat (Gujarat). We are supplier of Cashew Nut Machinery. We are also supplier of Cashew Processing Machinery in India.	Mr Vishal Patel Mobile No: +91 8511168502
100	Abhay Engineers	India	abhayengg@hotmail.com	+918242410121/ 2421785/ 2442655		All machines with solutions for smaller factories	Ganesh Kamath
101	Accurate Engineering	India	aeikuda@gmail.com	+91 2362 223 122 36997	http://www.aecashewsmachinery.com	Calibrator, Boilers, small cashew cutter, vibrator, dryers, small scale peeling machine, pieces separator and filling machines plus tables and ancillary equipment	Mr. Kausar Khan Mr. Rizwan Khan
102	Agrotech Industries	India	agroundustries3090@gmail.com	+91 231 252 9065 Mob +91 942 1200171	www.indiamart.com/agrotech-industries	Sheller, dryer, peeling machine	Mr. Nengounda Patil

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
103	Akshar Cashew Industries	India	aksharcashew@gmail.com	+91 9879341795, 9909908161	www.aksharcashew.co.in often not working so try https://www.indiamart.com/aksharcashew/profile.html	Full range of machines. Suitable for small to medium factories.	Sanjay Prajapati, CEO
104	AP Industries	India	info@apindustries.co.in	+91 90993 37500	apindustries.co.in	A full range of machines which may be suitable for mid range scale factories. The claims on performance are impressive but have not been tested in African environment.	P. V. Patel
105	Apna Industries	India	info@apnagroup.com	+910442340963	http://www.apnagroup.com	All Machines	Mr. V. S. Prasanna
106	ArtMachinery	India	tejhijb_asgar@yahoo.com info@artcashewmachinery.com	Mobile No: +91 7600520377, 9510321301 Ph. No : +91 2742-242377	http://artcashewmachinery.com/	Range of machines with innovative ideas especially for cutting and peeling	Tejhijb Maknojiya +91 76005 20377 Arif Aimi +91 95 103 21301
107	Atlas India	India	info@atlasmachinesindia.com gurpreetsingh@atlasmachinesindia.com m.mamteesingh@atlasmachinesindia.com atlas_@vsnl.com	00 91 22 66359900 , +91 40 23077478 (general) +91 9963328372 (For buying)	www.atlasmachinesindia.com		Gurpreet Singh Soni / Mammeet Singh
108	Best Engineering Technologies	India	bestengineering@gmail.com	+91 40 23077478 (general) +91 9963328372 (For buying)	www.bestengineeringtechnologies.com	Full range of automatic and manual equipment solutions	Mr. Seshu Sai
109	Bhaarat Machine Tools Industries	India		91-33-2368015 /2215236476570990(R)	https://www.indiamart.com/bhaaratmachinetoolindustries/	CNSL Expeller	Mr A. Bose
110	Bombay Engineering Works	India	mayur@bombayengg.com ; info@bombayengg.com	+912224137094/24135858	http://www.bombayengg.com	Drier	Contact via web site
111	Buddhi Industries	Sri Lanka	info@buddhiindustry.lk	+94112280086 +94777604150	http://www.buddhiindustry.lk/	Innovative shelling machines which are now in their fourth generation.	Mr. Maheepala Ms. Balasuriya Kankanamalage

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
112	Compressors and Controls Revanith Technologies	India	revanithtech@sify.com	+91 891-2573130, +91 891-6559635	https://www.tradeindia.com/fp1465816/Cashew-Peeling-Machine.html	Compressors and peeling machines. Suitable for smaller and medium factories	Mr. Eswar Robbi
113	Deepa Packers	India	deepapackers@gmail.com	T +91 2496485 (M) +91 9845120665, 9448121065	https://www.niir.org/directory/contact/201640/deepa-packers-mangalore-india.html	Suppliers of packing cartons	Mr. K. Surendra Prabhu / Mr. Sudhir Prabhu
114	Dhanalaxmi Industries	India	dnlaxmi@gmail.com	+91 427-2350674	www.indianexpeller.com	Specialist in oil expellers	Sanjeev Chabra
115	Dinesh compressor and Power Engineering	India	dineshcompressor@gmail.com	+91 9448134554, 9449084554	https://www.indiamart.com/dinesh-compressor/	Specialist in compressors and agent for other machines	Mr. Dinesh
116	Eagle Manufacturing Company	India		+91225007543	https://www.indiamart.com/eaglemanufacturing/	Strapping machines	Mr. Paresh Shah
117	Ellision Industries Pvt. Ltd	India		+91 9643205038, +91 9904599995	https://www.indiamart.com/ellisionindustries/	Full range of machines but some are sold as agent.	Malav Dave
118	Equestplast Technology Pvt.	India	sales@equestplast.com	+91 22-67031901, +91 22-67031902	www.equestplast.com	Full range of machines with a focus on Indian medium processors.	Raj Bandiwadaker
119	Essae Teraoka Pty Ltd	India	info@essae.com	+91 78 4881 23 46	http://www.essae.com/	Weighing machines suitable for cashew factories	Sunil K George
120	Falcon Craft	India	falconcraft@gmail.com	+91 474-2742425	https://www.tradeindia.com/Seller-3722648-FALCON-CRAFT/	Automated Cashew Kernel Peeling System, Cashew Kernel Peeling Machine, Airblast Conveyor	K. Kumar
121	Ganesh Expeller Works	India		+91222671325		CNSL Expeller	
122	G1Technologies	India	info@cashewmachines.com order@ gayathicashewmachinery.com	+91 44 66727299 and #91 9444344477	www.cashewmachines.com	Entire range of Cashew Processing machinery / Turnkey project	A. Sharithi

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
123	Goyum Screw Press	India	jain@oilmillmachinery.com goyum@oilmillmachinery.com	+91 98140 33180	https://www.oilexpeller.com	Machines for extraction of oils which can be used for CNSL.	Vinod Jain
124	Hitkari	India	gagan.sethi@hitkari-packaging.com	+91 98250 08332	http://www.hitkari-packaging.com/	Vacuum packaging machine	Gagan Sethi
125	Huhtamaki	India	+91 - 8458 - 279 628, 279 616	+914742742745	http://www2.huhtamaki.com/	Flexible barrier bags	
126	Instruments & Equipments Company	India	iecapd@yahoo.com, iecapd@gmail.com	+91 40 64198780	www.ieindia.in	Peeling machine medium capacity	Mr. Sagaya Raj
127	Italiya International	India	italyainternational@gmail.com, info@cashewprocessingmachinery.in	+91 8460606199	www.cashewprocessingmachinery.com	Specialist manufacturer with a range of machines suitable for small to 'large' medium factories	Ketani Italiya
128	K. S. Worldwide Exports	India	kulbir2649@gmail.com	+91 161-5000412, +91 161- 3243003	http://www.ksexport.co.in	Manual cashew machines for small scale industries	Kulbir Singh
129	Kamath Packaging	India	kamathagro@yahoo.com	Ph:0824-2431301, Mob:994551305		Manufacturer of packing materials	Shantharam Kamath
130	Krishna Industries	India	info@cashewmachine.net & krishnaindustriespalanpur@gmail.com	91274 2251313 Mob + (91)-9099510710	http://www.indiamart.com/krishna-industries-palanpur/ & http://cashewmachine.net/	Calibrator, steam cookers, peeling, shell/kernel separator, pieces screening machine, grading machines, conveyer equipment	Bhavesh Patel
131	Libra	India	Same director as Milestone am@miranda.in Librakollam@gmail.com	+91-9380519151 +9144-22781972	www.librainnovations.com	Packaging machines, bucket elevators, truck loaders, conveyors, metal detectors, vibro separators	Amaranth Miranda / J. B. Miranda

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
132	M.K.Associates	India	hk_maikal123@yahoo.com	Ph: +91 79-27453839 Mob: +91 9879041476	http://cashewmachinesmk.com/	Peeling machines, cutting machines and dryers https://www.youtube.com/watch?v=EUQgzJUAJ4	HK Maikal
133	Mahesh Tin Containers	India	mmanjunathprabhu@gmail.com	T +91 9448123227		Supplier of packaging tins.	Mr. M. Manjunath Prabhu
134	Milestone Speciality Equipment Pvt. Ltd	India	am@miranda.in milestonesplequip@gmail.com	+91-9380519151 +9144-22781972	http://miranda.in/milestone-speciality/	Advanced scooping machines, shelling machines, RCN sizer, separation systems.	Amaranth Miranda / J. B. Miranda
135	Muskaan Tradex	India	info@muskaangroup.com	+911126131421	http://www.muskaangroup.com	Full range of equipment	Rakesh Gupta
136	Nandadeep Containers	India	krjendraprabhu@hotmail.com	Ph:0824-2216465 Mob:9845088945		Containers for packing and transit through the factory.	Mr. K. Rajendra Prabhu Mr. Surender Prabhu
137	Nanopix	India	info@nanopix-iss.com	Board:+91 72040 36524 Sales: +91 70222 99990	http://www.nanopix-iss.com/	High tech cleaning and sorting machines.	Deepa Sobagin, CRM Executive +91 7899 223 999
138	Navinchandra and Co	India	navinchandra@airtelmail.in info@navinchandra.com	+914425228676 +914425228677 +914442163330	http://www.navinchandra.com	CNSL Expeller	Mr. Dinesh Sheth
139	Nexgen Drying Systems Ltd	India	shivanand@nexgenait.com	+912024391881 +91965716053	www.nexgenait.com	Cashew high technology for drying, sorting and packing.	Mr. Shivanand Shelge, Director Mr. Ajay Kulkarni, Marketing Engineer
140	Orange Sorter	India	sales@orangesorter.com	+9142224528888	www.orangesorter.com	Versatile sorting machines with possible applications to cashews	Mr. Lingaraj, Head of Customer Support +919443259116

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
141	PowerApex	India	thepowerapex@yahoo.com	+91 161 3017732 Mob +9199141 20797	www.thepowerapex.com	Boiler	
142	Premium Engineers	India	pawarbimbura@gmail.com	Tel: +91 79 6579293 Fax: +91 79 657 797	http://www.premiumentengineers.com	Bulk handling and bio mass	
143	Prompt Scales	India	info@promptscale.com	Tel 91 79 2656 5981/2/3 Fax 91 79 2640 7958	http://www.promptscale.com	Weighing scales	Sunil K. George
144	Raj Packaging Industries	India	hyd2_rajpack@bsnl.in	+91 93910 72519		Flexi pack supplies	Mr. Mohammad. Imran
145	Rorex Transmission	India	rorexindia@hotmail.com , rorexglobal@gmail.com ,info@ cashewnutmachine.com, rorex@rediffmail.	+912024363108	www.cashewnutmachine.com	Offers the full range of machines at relatively lower tech. end of the spectrum.	Rajesh Raskar
146	Royal Industries	India	royalrajamanickam@gmail.com chemaiarun29@gmail.com	+914424850494 +919444050494 +919445093746	http://www.royal-industries.com/	Boiler and cooker specialist with a range of other machines.	Mr. Arun
147	Satish Kumar & Brothers	India	cnscign@vsnl.net	Ph:011-28752119 Fax:011-28752118 Mob:9818752813		Offers a range of machines for smaller scale factories.	Mr. Satish Agarwal / Mr. Anil Goyal
148	Saurabh engineers	India	indvacad1@sanchamnet.in	+912025290475	http://www.saurabhengineers.com/	Packaging machines	
149	Sevana Packing Machines	India	sts@sevana.com	+914842680780	http://www.sevanapackagingmachines.com http://www.sevana.com/	Vacuum packaging machine	Mr. Mathew
150	SG FOOD TECHNOLOGIES	India	sgfoodtechnologies@gmail.com	+9140 65908498		Packing machines	
151	Sigma scales and systems	India		+914742760044 +919847181399 +919447266785	http://www.sigma-usa.com/	Weighing equipment	Indian agent of large US manufacturer of high quality scales

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
152	SKB Systems	India	skbs007@gmail.com	+91 4222 668299	www.industrial-humidifiers.com	Humidifiers and cleaning	Mr K. Shiva CEO Ms K. Manikandan, Lead Engineer
153	Spectrum Industries	India	sales@spectrumindustries.org	91 824 2221018 M: 91 98440 43990	www.spectrumindustries.org	Cleaning and sorting machines	Jeevan Saldanha, CEO Appanna K.M., Manager Marketing
154	Sri Banashankari Engineering Works	India	banashankarieng@yahoo.in	Ph: 08253-251387 Mob: 9448107646		Suppliers of full range of machines.	Mr. Athlu Kudal
155	Sri Venkateswara Industries	India	info@svind.in; venlee.mano@gmail.com	Tel +91 97 013 42 653	www.svind.in	Driers/Borma, single screw extruder and twin crew extruder	Mr. K. Venkatesh
156	Thangam Metal Cans	India	raja@svind.in krishnan@svind.in thangametal@gmail.com		None	Metal cans for packing	Mr. Raja; Mr. Krishnan
157	The TATA Iron and Steel Company	India	rajesh.rajan@tatasteel.com / contact.jusco@tatasteel.com.		http://www.tatasteel.com/	Tin containers	
158	Transworld Scales & Service	India	transk1m@yahoo.co.in	+91-474-274-2381	https://transworldscales.business.site/#details	weighing scales	
159	Venus Sorting Technologies Private Limited / Venus Industrialo Engineering works	India	coloursorter@yahoo.co.in	+91 99528 58855 ,94430 55855	www.venusorter.com	Innovation, high tech colour sorters.	R. Makesh Khumar, Managing Director
160	Vinayaka Engineering	India	vwork@dataone.in	+918242407939 +91 82407826	http://www.vinayakaengineering.com	Claims to offers the full range of machines and claims to offer full turnkey services .	Mr. Saduka Baliga Mr. Vinayak Baliga
161	VoiceEngineers Ltd.	India	truzealgh@gmail.com	+ (91) 221 651 28138, 65174411	www.dryersandcoolers.com	Dryers & Coolers	Charles Gloryman

No.	Name	Country	Email	Telephone	Website	Type of machine	Contact
162	Wadpack Limited	India	info@wadpack.in	+918041535491 +918023376895 +918023376929	http://www.wadpack.com/	Carton boxes for packing	
163	Weilal Machinery LLP	India	vikramjit@gmail.com	+91 9674594085 +91 9674594085	www.weilalmachinery.com	Sorting machines	Mr. Vikram
164	Bond Mechanism	India	bond.mech@in.com	+91 474 645 4082		Shelling and peeling machines	Ms. Priti Joy
165	Devi Enterprise	India	deventerprise50@yahoo.com	+91 281 237 8778	www.tradeindia.com/seller-4169657-Devi-Enterprise	Shelling and peeling autotmatic small:scale	Pravin Patel
166	JIN Industries	India	jnsales@gmail.com	+91 20 202 63060	www.casiewmachineries.com	Full range of machines	Jamil Akhtar
167	SMMS	India	mks@mme.net.in	+91 22 28715902	www.smms.co.in	Metal detectors in process	
168	Fowler Westrup	India	fwl@fowlerwestrup.com	+91 8152 282 500	www.fowlerwestrup.com	Cleaning machines and colour sorters	
169	Sepack	India	gl@sps.sevana.com	+91 484 268 2780	www.sepack.in	Packaging machines	
170	Essen Multipack Limited	India	essen@essenpoly.com	+91 2827 252018	www.essenpoly.com	Packaging machines	Vishal Kothari

The Competitive Cashew initiative (GIZ/ComCashew)

The Competitive Cashew initiative, formerly African Cashew initiative (GIZ/ACI), presents a new and innovative model of broad-based multi-stakeholder partnership in development cooperation. GIZ/ComCashew is a private-public partnership programme under the implementation of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, with funding from the German Federal Ministry for Economic Cooperation and Development (BMZ) as well as Cooperation Partners from the private and public sector.

GIZ/ComCashew's main objective is to increase the competitiveness of African cashew smallholders, processors and other actors along the value chain to achieve a lasting reduction of poverty in the project countries - Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mozambique and Sierra Leone. GIZ/ComCashew aims at ensuring that by 2020, each of the 580,000 cashew farmers trained will earn an average additional annual family income of at least \$600.

Beyond increasing farmers' direct income, the initiative aims at improving cashew processing capacity in Africa, developing sustainable supply chain linkages and supporting a better organisation and coordination of the cashew sector. GIZ/ComCashew also strengthens initiatives in the cashew sector and responds to questions regarding investment and processing.

It is time to accumulate and share the valuable experience and knowledge gained in the production and processing of raw cashew nuts and its by-products with industry as well as potential investors in the raw cashew nut processing sector.

This *Guidebook on Cashew Nut Processing Equipment* is to provide an overview of the technical information on a range of cashew nut processing machines and to provide a list selected suppliers of processing equipment. It is a practical guide on selection of processing equipment and their function in the process.

It provides valuable information on the following:

- selection of equipment, commissioning, installation and management of machines
- technical information on a range of cashew nut processing machines
- names and contacts of 170 selected suppliers of processing equipment
- basic guidelines and information on the different types of processing equipment and their function in the process

Other Titles in this Series:

- **Cashew Processing Guide Number 1:** Guidebook on the Cashew Processing Process
- **Cashew Processing Guide Number 2:** Opportunities and Challenges in Cashew Processing in Africa
- **Cashew Processing Guide Number 4:** Guidelines for Choosing Raw Cashew Nut Processing Equipment
- **Cashew Processing Guide Number 5:** Food Safety, Traceability and Sustainability in Raw Cashew Nut Processing

