

INTEGRATED WAREHOUSING INFORMATION AND MANAGEMENT SYSTEM

FIELD OF THE INVENTION

- 5 The present invention relates to an integrated warehousing information and management system.

BACKGROUND OF THE INVENTION

- 10 A Container Freight Station (hereinafter referred to as "CFS") is a warehouse that specializes in the consolidation and deconsolidation of cargo. An LCL (less than container load) shipment will be taken to a CFS at a port of origin to be consolidated at the CFS into a container with other cargo. The container will then be trucked and loaded onto a ship. Likewise, the CFS receives a container of cargo which would be
15 deconsolidated and re-exported or transported to different customers in locations from the CFS.

- Much of the operations at a CFS is manual and paper based. The international buyers acquire the goods from various vendors of a source terminal. The goods are shipped, by
20 the vendor, to a designated CFS warehouse where all the goods are unloaded for custom clearance. The goods are consolidated with other vendor's goods for the same buyer and same destination in a single container as a single large shipment and then it is transported to its destination station.

- 25 Clerical errors would sometimes occur when goods are handled in large volumes and the documentation may be mis-read or incorrectly transcribed. Errors would also occur when details are wrongly identified and reported by CFS staff. Sometimes haste in handling cargo would cause mix-ups.

30 DISCUSSION OF PRIOR ART

- US 2003/0009361 A1 proposes a logistics node receives a purchase order from a customer. The logistics node selects an appropriate carrier to transport products specified in the purchase order and conveys shipping instructions to the selected carrier.
35 The logistics node also coordinates the shipment by interacting with a source node

(associated with a supplier of the products) and a destination node (associated with the recipient of the products). According to one exemplary feature, the logistics node provides an interface that permits users involved in the distribution chain to track the status of the shipments without having to enter tracking codes that are unique to individual carriers. According to another exemplary feature, the interface allows a user to access multiple "levels" of information regarding a shipment, including information pertaining to an individual product within a shipment containing multiple products. According to another exemplary feature, the interface allows a user to change the priority status associated with particular products that have already been presented for shipment. According to another exemplary feature, the interface provides different "views" for use by different respective users. Each of the views provides a corresponding different set of tools for use in interacting with the freight managing service.

US 7,761,348 B2 discloses an integrated global shipment system that provides end-to-end visibility of the movement of a package. The integrated global shipment system employs a shipment consolidating application for integrating one or more freight tracking systems with one or more end-delivery systems. As a result, shippers are provided with complete visibility of the movement of their shipments of goods from an origin country to a destination country and till the final consignees. In addition, the integrated shipment system significantly decreases the cost of managing inventories by providing a virtual inventory solution. Under this virtual inventory solution, suppliers are able to bypass distribution centers and delay allocation of goods until after the importation of goods into a destination country.

US 8,417,550 B2 is a patent for an inland freight management module for managing inland moves of freight from a plurality of vendor supply locations to port includes a profile maintenance component, a load planning component, and a load routing and booking component. The profile maintenance component is adapted for maintaining an inland planning zone profile including information relating to a plurality of inland planning zones generated according to one or more customs districts. The load planning component is programmed for planning field consolidation of one or more container loads via a multi-stop route between the plurality of vendor supply locations, where the multi-stop route is generated within one of the pluralities of inland planning zones.

CN 84057 describes an invention relates to an intelligent warehousing system. The system comprises electronic tags, a reader-writer, an application system and an interconnecting link, wherein the application system consists of the following subsystems: a data management system (1), a warehousing system (2), a trolley-type intelligent stocktake system (3), a warehouse moving system (4) and an ex-warehouse system; the subsystems are connected through the interconnecting link; the data management system (1) is responsible for entering the information of commodities or materials and manufacturing the RFID electronic tags in one-to-one correspondence, and the electronic tags correspond the relevant information of products; and if the information is qualified and accurate, the RFID electronic tags are adhered to (or hung on) the commodities or the materials, and the commodities or the materials are allowed to be put in storage. The intelligent warehousing system can perform the stocktake, ex-warehouse and warehousing of cargos in warehouses in time.

CN 103625812 for an invention entitled “Warehousing device capable of automatically identifying goods” describes a warehousing device capable of automatically identifying goods. The warehousing device capable of automatically identifying goods comprises warehousing goods shelf transverse plates and warehousing goods shelf vertical pillars, wherein the warehousing goods shelf transverse plates and the warehousing goods shelf vertical pillars form a goods warehouse shelf, radio-frequency readers are arranged on the warehousing goods shelf vertical pillars, goods are arranged on the warehousing goods shelf transverse plates, and the radio-frequency readers are directly connected with a logistics management information system through the network. When the goods bonded with electronic labels are arranged on the warehousing goods shelf transverse plates the radio-frequency readers are used for reading the information of the electronic labels on the goods, and warehousing goods space information is automatically generated in the logistics management information system. When the goods bonded with the electronic labels are taken away from the warehousing goods shelf transverse plates and pass through an electronic door of the warehouse, the logistics management information system automatically converts the state information of the goods. The warehousing device capable of automatically identifying goods is high in work efficiency and brings convenience to searching of goods.

JP 2010-222082 is an invention for “Method for shipping and warehousing cargo “. It proposes a solution to the problem identified as provide a method for shipping and

warehousing cargoes in a physical distribution system capable of more efficiently shipping and warehousing cargoes than a conventional method by reducing stand-by time of cargos waiting for warehousing. The solution offers a cargo conveying device conveys cargoes of warehousing objects up to a warehousing port of an automated warehouse having designated storage shelves based on a warehousing instruction from a cargo control computer, and a cargo transferring machine warehouses the cargoes of the warehousing objects from the warehousing port to the storage shelves. When the cargo control computer receives information on the cargoes of the warehousing objects in a state of no cargo storing parts capable of warehousing cargoes in the storage shelves, the cargo control computer confirms the presence or absence of cargoes to be shipping objects. When cargoes of the shipping objects exist, the cargo control computer performs a warehousing instruction to designate a shipping origin of the cargoes of the shipping objects as a warehousing destination of the cargoes of warehousing objects while the cargoes of the shipping objects are shipped to a shipping port after performing the shipping instruction of the cargoes of the shipping objects.

There do not seem to be any integrated warehousing information and management system which would allow a specific cargo and related data to be tracked from the time it is received into the warehouse or CFS, allow additional data to be created and tagged to the same cargo and updated real time, then stored within the warehouse or CFS until it is shipped out from the warehouse or CFS into a container to be shipped to its next destination or released to the customer, together with appropriate documentation and accompanying electronic data.

A major problem in the operations of a CFS or warehouse is the cargoes are in different shapes and sizes, and are also either safely wrapped up (to protect their contents) or packaged, thus making visual identification of its contents difficult. It would be preferable if the contents of the cargoes are immediately and accurately disclosed whenever a person checks their contents just standing in front of the said cargoes.

SUMMARY OF THE INVENTION

A first object of the invention is an integrated warehousing information and management system comprising

- (i) a warehouse for receiving and storing cargoes with accompanied documents containing details of the cargoes, wherein the cargoes are unpacked from a cargo container;
- (ii) a plurality of smart tags being used to attach to each of the cargoes, wherein the smart tags contain the details of the cargoes;
- (iii) a plurality of electronic devices for registering and data processing of cargoes details being used to handle the cargoes, wherein the electronic devices include personal Computers, laptops, computing devices and smart phones and the like;
- (iv) a plurality of positioning/location sensors and imaging devices mounted within the warehouse to enable locating and accessing of the cargoes, wherein the imaging device includes object recognition and OCR;
- (v) data responders and transmitter for intercommunication of the smart tags and the electronic devices; and
- (vi) a central server for which the data/information on every cargo coming into the warehouse or CFS, stored therein and leaving the CFS are tracked which contained data on these cargoes (downloaded from the system) and further updated with the location data of the cargoes, thereby the data relating to any cargo received into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

Preferably the integrated warehousing information and management system has a dimensioning station to compute weight and volumetric measurement of the cargoes.

Preferably, the integrated warehousing information and management system have a plurality of positioning/location sensors, and the smart tags are digitally interconnected to provide the exact location and status of the cargoes within the warehouse.

More advantageously, the integrated warehousing information and management system has WIFI router devices for wireless communication of the electronic devices.

Preferably the integrated warehousing information and management system have all the electronic devices linked to the central server so that data on every object coming into

the warehouse or CFS are stored therein and leaving the CFS are tracked which contained data on these cargoes.

Preferably the integrated warehousing information and management system have electronic data relating to any cargo delivered into the CFS immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

A second object of the Invention is to a method of cargoes handling within a warehouse with an integrated warehousing information and management system comprising the steps of

- (i) receiving and storing cargoes with accompanied documents containing details of the cargoes, wherein the cargoes are unpacked from a cargo container;
- (ii) tagging to each individual cargo with a smart tag, wherein the smart tags contain the details of the cargoes;
- (iii) registering and data processing of the cargoes using a plurality of electronic devices for registering and data processing of cargoes, wherein the electronic devices include personal Computers, laptops, computing devices and smart phones and the like;
- (iv) mounting a plurality of positioning/location sensors and imaging devices within the warehouse to enable locating and accessing of the cargoes, wherein the imaging device includes object recognition and OCR;
- (v) initiating data responders and transmitter for intercommunication of the smart tags and the electronic devices; and
- (vi) operating a central server for which the data/information on every cargo coming into the warehouse or CFS, stored therein and leaving the CFS are tracked which contained data on these cargoes and further updated with the location data of the cargoes, thereby the data relating to any cargo received into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

Preferably the method of cargoes handling uses a dimensioning station to compute weight and volumetric measurement of the cargoes.

Preferably the method of cargoes handling requires electronic data relating to any cargo received into the CFS to be immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

- 5 Preferably the method of cargoes handling allows input of additional data on each cargo in the warehouse through photographs taken in the warehouse, with input of additional information on the cargo.

- 10 A subsidiary object of the integrated warehousing information and management system is the dimensioning station which takes measurements of the weight and volume of the cargo and a plurality of photographs of the cargo to be also taken.

- 15 Another subsidiary object of the invention is a method of tagging all cargoes wherein the details of the cargoes are affixed to the exterior of the cargoes, by means of a plurality of smart tags.

More advantageously the method of cargoes handling using smart tags affixed onto the exterior of each cargo allow continuously tracking of the cargo within the warehouse.

- 20 Preferably the method of cargoes handling using smart tags requires the cargo leaving the warehouse to have the electronic updated data of the cargo electronically transferred to another party in a supply chain.

- 25 More advantageously the method of cargoes handling requires all data of the cargo including weight, volume, photographs, fresh data on the cargo entered when the cargoes are in the warehouse to be also uploaded electronically and matched with existing data of the cargo stored in the server.

- 30 Preferably the method of cargoes handling requires all cargoes within the warehouse to be being electronically tagged and tracked within the CFS or warehouse.

- 35 More advantageously the method of cargoes handling allows a person holding an electronic device containing the data of the cargo to identify and locate each cargo accurately and precisely.

Preferably the method of cargoes handling enables access to the data of the cargo through hand held electronic devices including smart phones, tablets and laptops.

5 More advantageously the method of cargoes handling further comprise the step of tagging cargoes with an electronic transmitter to ensure the cargoes are accurately positioned and are easily located by a warehouse staff.

10 Preferably the method of cargoes handling enables a warehouse staff to scan the smart tag affixed to a cargo to obtain all data relating to the cargo in real time and instantly.

Preferably the method of cargoes handling allows warehouse staff including forklift operators, and delivery clerks to verify details of each cargo by using a tablet installed in a forklift or their hand-held electronic devices.

15 Preferably the method of cargoes handling enables warehouse staff to verify the details of the cargo in case of doubt in any instant.

20 The warehousing information and management system reduces clerical errors arising from mis-read or incorrectly transcribed when large volumes of cargoes are handled. Errors by warehouse or CFS staff entering fresh details of cargoes are greatly reduced. Mix up in shipments arising from clerical errors are also greatly reduced.

25 Objects of the present invention are not limited to the aforementioned objects, and other objects may exist. This will be understood by those of ordinary skill in the art by the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

30 For a better understanding of the invention, its advantages, and the objects attained by its use, reference should now be made to the accompanying drawings. The accompanying drawings illustrate one or more embodiments of the invention and together with the description herein, serve to explain the workings and principles of the invention. The drawings by no means restrict the invention to only what is shown.

35 Fig 1 (Prior Art) shows a current (manual) procedures for unstuffing a container.

Fig 2 (Prior Art) shows a current (manual) procedures for release of cargo to a listed receipient after unstuffing.

5 Fig 3 (Prior Art) shows a current (manual) procedures carried out in a CFS for receiving cargo for shipment.

Fig 4 (Prior Art) shows a current (manual) procedures for stuffing of cargo (which has been received) into a container for shipment.

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Fig 5 is a system overview of the integrated warehousing information and management system of the invention.

15 Fig 6 shows the procedures for release of cargo to a listed receipient after unstuffing, under the integrated warehousing information and management system of the invention.

Fig 7 is a schematic showing how the system for release of cargo after unstuffing works.

20 Fig 8 shows the procedures for receiving cargo under the integrated warehousing information and management system of the invention.

Fig 9 is a schematic showing how the system for receiving cargo works.

25 Fig 10 shows the procedures for release of cargo under the integrated warehousing information and management system of the invention.

Fig 11 is a schematic showing how the system for release of cargo works.

30 Fig 12 shows the procedures for stuffing of cargo under the integrated warehousing information and management system of the invention.

Fig 13 is a schematic showing how the system for stuffing of cargo works.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

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Exemplary embodiments of the present invention will be described in detail with reference to the drawings.

A CFS is typically a warehouse which receives cargoes, unpack and stores the cargoes and also sends out some cargoes, re-combine cargoes and pack these cargoes for shipment. Much of the operations at a warehouse or CFS is manual and paper based. Therefore, the description of the operations of the CFS would equally apply to the operations of a warehouse. Hence the term "CFS" and "warehouse" may be used herein interchangeably.

Fig 1 (Prior Art) to Fig 4 (Prior Art) shows typical flows of cargoes and documents in the handling of goods in a CFS: -

(a) goods received from various exporters, stored temporarily in the CFS and then re-packed (stuffed) into a container to be shipped to a specific location.

(b) goods received into the CFS (from a container) and unpacked (unstuffed) to be delivered locally or stored temporarily in the CFS and then transported to other locations or even re-shipped (stuffed) into another container to be shipped to other countries.

Since the documents are paper-based, clerical errors would arise in recording the details of the goods or transcribing such details. Human errors may also arise when details are not clearly indicated or labelled in the goods themselves. Human errors may also arise when mistakes are made in identifying the correct cartons or packaging since the goods are not visible since these are wrapped up or packaged securely. Time is also spent locating goods due to the inability to correctly locate their specific place of storage.

Fig 1(Prior Art) show the current (manual) procedures carried out in a CFS for unstuffing a container.

An import manifest is received from the exporter. The staff in the CFS would prepare and update the records for unstuffing. Checks are made of container number and seal in the container. Visual checks are made of the seal (that it is not damaged) and also of the exterior of the container, again for damage.

Discrepancies and damages to seal or container are reported and photographs taken and reports prepared. Report preparation with photographs take time. Again clerical errors may arise in the preparation of the discrepancies and damaged cargo.

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If there is no damage and all in order, the following are carried out:-

- (a) Tally cargo according to manifest & affix correct sticker
- (b) For cargo that cannot be tallied, no marking, no BL, no description, the cargo is
10 either reported as over landed and short landed
- (c) Take photo of cargo & marking
- (d) Record measurement of (Transshipment) cargo
- (e) Take photos for every layer of unstuffing
- (f) Upon completion of unstuffing, take photo of floor board
- 15 (g) For 40ft container, 2 photos, 1 at half way mark, 1 at door way
- (h) Take photo of half door with container number side

The unstuffing procedures take time since every item of cargo has to be accounted for. In the process, clerical errors may arise and additional work has to be carried out to
20 check all discrepancies and errors. Reports have to be prepared manually. Photographs have to be taken.

Fig 2 (Prior Art) show the current (manual) procedures carried out in a CFS for release of cargo to a listed recipient after unstuffing.

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The clerk would carry out the following:-

- (a) Check the date and time of clearing on DO / SO
- (b) Check whether cargo is local or transshipment or release to co-loader
- 30 (c) Check whether details are filled on the releasing stamp

Warehouse operations would carry out the following tasks: -

- (a) Determine the weight /volume manually
- 35 (b) Determine/identify the following

- (i) Number of packages
- (ii) Sequence number
- (iii) Description of cargo
- (c) Locate the cargo and match the following

- 5 (i) Correct client sticker
- (ii) Container number
- (iii) Number of packages
- (iv) Sequence number
- (v) Cargo marking

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If the goods are checked to match the documents, a round red color sticker would be affixed to the goods. This would enable the forklift operator to correctly identify the cargo who would then load the cargo onto the consignee truck.

- 15 Fig 3 (Prior Art) show the current (manual) procedures carried out in a CFS for receiving cargo for shipment.

The clerk would check the documents to match the goods to the customer. Checks are made to ensure details are correctly filled in the export sticker:-

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- (a) Correct customer sticker
- (b) Vessel / Voyage
- (c) Port of destination
- (d) Booking number
- 25 (e) Number of packages
- (f) Cargo marking
- (g) Cargo measurement

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Again, the cargo are checked for damage. If there is any damage, this is reported and the following additional work are carried out:-

- (a) Take photo for damage cargo
- (b) Indicate remark on SO
- (c) Inform warehouse manager
- 35 (d) Inform customer

- (e) Wait for confirmation to receive

If the cargo are inspected to be in order, then the cargo are accepted and stored. Again the fork lift would take the cargo and stored these in designated lots.

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Fig 4 (Prior Art) show a current (manual) procedures carried out in a CFS for stuffing of cargo (which has been received) into a container for shipment.

10 When export load plan is received from a client, stuffing instructions are issued. The cargo (stored in different locations in the warehouse) are located manually and laid out. The cargo are then checked to makesure there is no missing shipping note or delivery order. The Tally Clerk would check the cargo according to load plan carrying out these procedures, manually:-

- 15 a. Check numbered sticker
 b. Check booking number
 c. Check port destination
 d. Check marking
 e. Check quantity of packages
 20 f. Look out for special instructions, i.e. do not stack, take photos
 g. Check container number and seal
 h. Check container booking number on EIR (Equipment interchange receipt)
 i. Check container exterior for d

25 Again if cargo is damaged, reports are made and checks and photographs taken. If the cargo is finally in order, then stuff begins and reports prepared including printed tally sheet and sending printed tally sheet to customer.

30 It may be seen that the procedures are labour intensive and heavily reliant on visual checks and paper-based reports and taking of photographs. Due to heavy involvement of humans, clerical errors would occasionally arise. The clerical errors result in additional costs – compensation for lost cargoes, compenstion for delays and costs of re-routing some cargoes. Such clerical errors would therefore result in higher operating costs of the CFS operator, thereby affecting margins and profitability.

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Whether a shipment is unstuffed from a shipment and stored in the warehouse or retrieved in the warehouse for re-packing and shipment, a major problem in the operations of a CFS or warehouse is that the stored cargoes are in different shapes and sizes, and are also either safely wrapped up (to protect their contents) or packaged.

Furthermore, it is not cost effective nor practical to allocate specific locations for the storage of cargoes. Thus, when a shipment is being prepared for sending out, warehouse person attempting to retrieve the cargoes must search for the correct cargoes, before arranging these into a shipment for stuffing into a container. Due to the various sizes and the protective packaging, visual identification of its contents difficult. The integrated warehousing information and management system offers a solution to this problem. A smart tag is attached to each cargo (be it a carton or wrapped packaged cargo). The smart tag would be updated with details of the cargo (downloaded from the servers) and include location data. Therefore, with the use of a smart tag attached to each cargo, the contents of the package or cargo is immediately and accurately disclosed whenever a person checks their contents by using his laptop or hand held device or mobile phone when standing in front of the said cargo.

Fig 5 is a system overview of the integrated warehousing information and management system of the invention.

The warehouse is represented by the circle, which receives physical cargoes accompanied by physical documents containing details of these cargoes.

The cargoes are unpacked after receipt into the warehouse. Manual procedures for receipt and unpacking the cargoes are also illustrated in Fig 1 to Fig 4. The procedures for receipt and unpacking the cargoes under the integrated warehousing information and management system are illustrated in Fig 6 to Fig 13.

The cargoes are then processed at a dimensioning station and stored temporarily or despatched to the customer.

If the cargoes are stored, the cargoes are attached with smart tags which contained data on these cargoes (downloaded from the system) and further updated with their location data.

The stored cargoes are then re-packed for shipment. Manual procedures for retrieval and packing the cargoes are illustrated Fig 3 (Prior Art) and Fig 4 (Prior Art). The procedures for retrieval and unpacking the cargoes under the integrated warehousing information and management system are illustrated in Fig 8 and 9.

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The integrated warehousing information and management system has these features (not exhaustive):-

- (a) plurality of Personal Computers, laptops, computing devices and smart phones;
- 10 (b) plurality of sensors forming one or more dimensioning stations to compute weight and carry out volumetric measurements of cargoes;
- (c) imaging devices including object recognition and OCR;
- (d) plurality of data storage, smart tags, antennas and transmitting devices to give location details of each cargo;
- 15 (e) plurality of position/location sensors;
- (f) data responders and transmitters; and
- (g) Wi Fi routers which link all electronic devices wirelessly.

20 All electronic devices are linked to a central server so that data on every object coming into the warehouse or CFS, stored therein and leaving the CFS are tracked, stored and retrieved for processing and operational use and reference in the CFS.

Electronic data relating to any cargo received into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from
25 exporters. Additional data on each cargo in the warehouse are taken as and when required e.g. through photographs, with additional information on the cargo. When the cargo leaves the warehouse, the electronic updated data of the cargo are also electronically transferred to another party in the supply chain (while the physical documents and cargoes are being shipped out to this party).

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An inventive feature of the integrated warehousing information and management system is the dimensioning station. A dimensioning station comprises a plurality of sensors, imaging devices and data transmitters located at strategic locations in the CFS. The dimensioning station allows measurements of the weight and volume of the cargo to be
35 taken. Photographs of the cargo are also taken. The cargo are also tagged and details

of the cargo affixed to the exterior of the cargo, by means of smart tags. These smart tags affixed onto the exterior of each cargo allow continuous tracking of the cargo within the warehouse. At the same time, all data of the cargo – weight, volum, photographs, data on the cargo are also uploaded electronically and matched with existing data of the cargo (sent by the shipper), into the servers. As a consequence of the use of the dimensioning station, all cargo would be electronically tagged and tracked within the CFS or warehouse. This allows warehouse personnel to identify and locate each cargo accurately and precisely.

The dimensioning station is used for unstuffing and stuffing operations. Sometimes damaged cargo are observed during unstuffing or during stuffing operations. The dimensioning stations would quickly scanned all details of damaged cargo. Warehouse personnel would also take photographs of the damaged cargo. These photographs are electronically and instantly uploaded into the integrated warehousing information and management system. Reports on details of damaged cargo and photographs are then electronically prepared and sent to affected departments and to cargo owners. It may be seen that the integrated warehousing information and management system would improve operations, with faster turnaround times, faster and more accurate reports and also enabling all cargo to be tagged and tracked within the CFS or warehouse.

Easy access to data on each cargo is provided either through hand held devices such as smart phones, tablets and laptops. Even the forklifts are equipped with tablets so that the forklift operators are able to locate and retrieve cargo accurately and correctly. This inventive feature has greatly improved productivity of the forklift operators by reducing errors and reducing time in locating, and identifying correct cargoes before picking these cargoes up.

Since all cargo are tagged with electronic transmitters, check of the contents of the cargo would be easily facilitated. A warehouse staff may just scan the smart tag and obtain all data relating to the cargo in real time and instantly. In the case of the forklift driver, access to a tablet installed in the forklift would allow access to the data of the cargo identified in the screen of the tablet. The forklift driver would be able to verify the details of the cargo in case of doubt in an instant, instead of getting off the forklift and physically checking the details described on the surface of the cargo.

The system would reduce the manual paperwork required and at the same time, improve accuracy of information, improve access to information on cargo in real time, reduce time spent in preparing manual reports with photographs and thus improve productivity in CFS operations. The integrated warehousing information and management system would also merge details of the physical cargo and cargo information in accompanying physical documents and at the same time verify these details with electronic data on the same cargo in the integrated warehousing information and management system. As such, data on all cargoes received and stored in the warehouse are instantly updated and electronically tagged in the warehouse, including their storage location.

Fig 6 show the procedures for release of cargo to a listed receipient after unstuffing, under the integrated warehousing information and management system of the invention.

Fig 7 is a schematic showing the how the system for release of cargo after unstuffing works.

A description of how the integrated warehousing and management system works would be provided by reference to Fig 6 and Fig 7 on the work in unstuffing a container.

The import manifest from the client is received via xml, EDI or other data sources, all of which are in electronic data format. The warehouse personnel selects the correct container from the tablet. Visual checks are still made for damage to seal or container. If there are damages, the warehouse personnel now takes photographs of the damaged items either from the tablet or mobile phone which are then uploaded to the server and report with photographs sent to the client.

If all is in order for unstuffing, warehouse personnel commences the unstuffing operations again using the tablet to record all data. The physical cargo are matched to correct records and electronic tag is affixed onto the cargo and placed into plastic sleeves.

A Forklift picks up cargo and brings the cargo to the dimensioning machine, which carry out the following: -

- a. Dimensioning machines detects tag

- b. Once cargo is on weighing platform, screen display changes to 'scanning', system triggers weight weighing, dimension measuring and photo taking
- c. Upon completion, screen display on the forklift changes to 'Ready'

- 5 The final step is carried out by the warehouse personnel completing all data of the cargo in the container on tablet. The integrated system synchronizes all information to databases (in the server), update container status to empty, unstuffing timing and an unstuffing report is now ready for generation.
- 10 In the event damaged cargo are observed during unstuffing operations, the dimensioning stations would quickly scanned all details of damaged cargo. Warehouse personnel would also take photographs of the damaged cargo. These photographs are electronically and instantly uploaded into the integrated warehousing information and management system. Reports on details of damaged cargo and photographs are then
- 15 electronically prepared and sent to affected departments and to cargo onwers.

- Referring to Fig 7, it may be seen that data on each shipment would have been received by the CFS when the client sends the shipment information to the CFS. Thus, when the container with the shipped goods come into the warehouse of the CFS, all personnel in
- 20 the warehouse including the forklift would have data on all goods coming in. Likewise, the integrated warehousing information and management system would have a unique smart tag attached. The smart tag would accompany that cargo throughout its time in the warehouse and would be updated instantaneously if details on the cargo are changed. For example, after the forklift had brought the cargo to the dimensioning station for taking
- 25 weight and volume data, the data in each cargo would now include volume and weight. Once the forklift sends the cargo to a specific location in the warehouse, the storage location of that particular cargo is once again uploaded to the database. Therefore before, during and after the entire unstuffing operation, all personnel in the CFS would know details on each cargo (depending on their function) that has been unstuffed and stored
- 30 in the warehouse. Therefore, at any one time, warehouse personnel may be able to locate each cargo in the warehouse precisely and also have access to other details such as contents, weight and so on. However, the client would only receive the unstuffing report and report on damaged cargoes.

Fig 8 show the procedures for receiving cargo under the integrated warehousing information and management system of the invention.

Fig 9 is a schematic showing how the system for receiving cargo works.

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A description of how the integrated warehousing information and management system works would be provided by reference to Fig 8 and Fig 9 on the work in receiving cargo.

Warehouse personnel would check cargo for damage, as follows: -

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- a. Take photo on damaged cargo
- b. Indicate remark on SO
- c. Inform warehouse manager
- d. Inform customer
- e. Wait for confirmation to receive

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All data on damaged cargo would again be uploaded into the databases. Report on damaged cargo would also be generated and sent to all parties involved.

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If the shipment is in order, the cargo is then picked up by a forklift which proceeds with the cargo to dimensioning system. The following then takes place: -

- a. Dimensioning machines detects tag
- b. Once cargo is on weighing platform, screen display changes to 'scanning', system triggers weight weighing, dimension measuring and photo taking
- c. Upon completion, screen display changes to 'Ready'

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The forklift picks up cargo from dimensioning system and stores cargo in warehouse. Details of a shipment coming into the CFS would be provided by the client and uploaded into the database. All warehouse personnel would thus be kept up to date on all cargo coming into the warehouse. The warehouse personnel would match physical cargo to correct booking reference, update quantity and attach an electronic tag on the cargo (stored in plastic sleeve). The electronic smart tag would contain all details of the particular shipment and would be updated in real time within the warehouse with additional information such as location of storage. All information on the cargo would

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appear on the devices used in personnel in the warehouse. Specific data on cargo acceptance would be transmitted to the client on request. It may be seen that during the cargo receiving process, paperwork is much reduced.

- 5 Fig 10 show the procedures for release of cargo under the integrated warehousing information and management system of the invention.

Fig 11 is a schematic showing how the system for release of cargo works.

- 10 The clients' representative comes to the CFS with documents for the release of cargo. The database is updated with the details of the cargo to be released. The forklift operator is informed to pick up the cargo with the details as stated in the system (displayed on a tablet in the forklift). The cargo to be released is also indicated on the screen of the tablet in front of the forklift operator. The Forklift driver picks up the indicated cargo (based on
15 the 'dots' shown on the screen of his tablet.) The cargo picked up is then transferred to a holding area for checking by warehouse personnel. The movement of the cargo would be immediately transmitted to the server each time there is a change in its status.

Warehouse personnel would carry out the following checks: -

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- (a) Check the date and time of clearing on DO / SO
- (b) Check whether details are filled on the releasing stamp
- (c) Remove and scan tag to confirm
- (d) Signal the forklift operator cargo ready

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- The cargo is then loaded onto consignee truck. Upon release of the cargo, the database would be immediately updated. The client would also have the details of the released cargo sent to them, again from the CFS database. The entire process of releasing the cargo is driven by the data relating to the cargo to be released. The cargo is picked up
30 accurately and correctly since the details of the cargo are electronically picked up and tracked throughout the entire time the cargo is in the CFS or warehouse. Human errors in picking the wrong cargo previously associated with the manual procedures and paper-based documentation would be avoided.

Fig 12 show the procedures for stuffing of cargo under the integrated warehousing information and management system of the invention.

Fig 13 is a schematic showing how the system for stuffing of cargo works.

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The warehouse would receive an export load plan from client. The database would be updated with the details of the cargo in the export load plan. The warehouse personnel would have their tablets and Personal Computers updated with the details of the cargo to be picked up.

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The cargo again would be indicated in the tablet of the forklift operator and correctly picked up. The forklift operator would locate the cargo, guided by the location of the cargo shown in the tablet screen. Upon locating the cargo, the forklift operator affix a numbered sticker worked out by the load plan. The cargo is then laid out in another area for stuffing of the cargo into a container.

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A Tally Clerk would go through the load plan and select details of the correct container for stuffing. The Tally clerk would update details of the cargo according to information shown on tablet:-

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- a. Check numbered sticker
- b. Check booking number
- c. Check port destination
- d. Check marking
- 25 e. Check quantity of packages
- f. Check photo
- g. Remove and scan tag
- h. Look out for special instructions. IE, do not stack, take photos using tablet
- 30 i. Check container number and seal

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In the event a wrong cargo (not part of the cargo to be stuffed) is identified, the forklift operator would bring the cargo back to storage. Again, such information would be updated to the database immediately. When stuffing commences, the following tasks are carried out:-

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- (a) Apply cancellation method
- (b) Take photos for every layer of stuffing
- (c) Take photo of last layer upon completion
- 5 (d) Take photo of half door with container number side
- (e) Take photo of correct seal
- (f) Take photo of sealed container

10 The photographs are immediately uploaded to the database. Once the Tally Clerk completes stuffing of the container, the details are immediately uploaded onto his tablet, and the data in the system synchronizes all information to database, update container status to stuffed and stuffing time indicated. A stuffing report is also ready for generation.

15 The entire process of stuffing cargo is driven by the data relating to the cargo to be stuffed. The cargo is picked up from its stored location accurately and correctly since the details of the cargo are electronically picked up and tracked throughout the entire time the cargo is in the CFS or warehouse. The cargo is then laid out and further checked to ensure the correct cargo is stuffed. Details of cargo stuffed into the container would be matched with the details in the export plan. Human errors in picking the wrong cargo
20 previously associated with the manual procedures and paper-based documentation would be avoided. Human errors by forklift operators in picking the wrong cargo cannot possibly occur. Should the wrong cargo be picked up, this would be indicated to the Tally Clerk as the wrong cargo would be highlighted since the wrong cargo is not matched to the details of the export plan. All movement of cargo would be picked up by the array of
25 sensors and transmitters and matched. Likewise all movements of small electronic devices are tracked so that if an electronic smart tag is not removed before a cargo leaves the warehouse or CFS, the integrated warehousing information and management system would alert warehouse personnel (through alert message on screen and system setting off a buzzer to physically alert personnel nearby) so that the electronic smart tag
30 is removed before the cargo leaves the warehouse or CFS.

The invention therefore addresses the most crucial part of the warehouse or CFS operations which is receiving the correct cargo either from an exporter or unstuffing from a container, retrieving the correct cargo for stuffing or release/recharging process. In the
35 case of warehouse operations, the invention would also address the most crucial part of

the warehouse operations which is ensuring the receiving of correct cargo storing the cargo temporarily in the warehouse, retrieving the correct cargo for stuffing or release to a third party.

- 5 As the data from incoming cargo are entered electronically into the database of the integrated warehousing information and management system, the data relating to the cargo is immediately matched, identified in the system, updated whenever there are changes including storage location and tracked in the warehouse until the cargo are released.

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ADVANTAGEOUS EFFECTS OF THE INVENTION

The present invention allows warehouse staff to have real time and up to date information on all cargo in the CFS or warehouse.

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The Invention also empowers all CFS staff or warehouse staff to be more productive and at the same time reduce the number of human errors arising from bad transcribing or incorrect reading of details. Manual paperwork and manual preparation of reports is greatly reduced.

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The invention also enables CFS or warehouse staff to pick and pack cargo accurately and correctly thus reducing costs arising from wrong shipments or wrong despatches. Electronic data on the re-packed cargoes are also electronically transferred to other parties in the supply chain thus ensuring data on such cargoes accompany the physical transport of such cargoes.

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CLAIMS

1. An integrated warehousing information and management system comprising
 - (i) a warehouse for receiving and storing cargoes with accompanied documents containing details of the cargoes, wherein the cargoes are unpacked from a cargo container;
 - (ii) a plurality of smart tags being used to attach to each of the cargoes, wherein the smart tags contain the details of the cargoes;
 - (iii) a plurality of electronic devices for registering and data processing of cargoes details being used to handle the cargoes, wherein the electronic devices include personal Computers, laptops, computing devices and smart phones and the like;
 - (iv) a plurality of positioning/location sensors and imaging devices mounted within the warehouse to enable locating and accessing of the cargoes, wherein the imaging device includes object recognition and OCR;
 - (v) data responders and transmitter for intercommunication of the smart tags and the electronic devices; and
 - (vi) a central server for which the data/information on every cargo coming into the warehouse or CFS, stored therein and leaving the CFS are tracked which data on these cargoes (downloaded from the system) and further updated with the location data of the cargoes, thereby the data relating to any cargo received into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.
2. The integrated warehousing information and management system as set forth in Claim 1, further comprising (vii) a dimensioning station to compute weight and volumetric measurement of the cargoes.
3. The integrated warehousing information and management system as set forth in Claim 1, wherein the plurality of positioning/location sensors, and the smart tags are digitally interconnected to provide the exact location and status of the cargoes within the warehouse.

4. The integrated warehousing information and management system as set forth in Claim 1, further comprising WIFI router devices for wireless communication of the electronic devices.

5. The integrated warehousing information and management system as set forth in Claim 1, wherein all the electronic devices are linked to the central server so that data on every object coming into the warehouse or CFS are stored therein and leaving the CFS are tracked which contained data on these cargoes.

6. The integrated warehousing information and management system as set forth in Claim 1, wherein electronic data relating to any cargo delivered into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

7. A method of cargoes handling within a warehouse with an integrated warehousing information and management system comprising the steps of: -

- (i) receiving and storing cargoes with accompanied documents containing details of the cargoes, wherein the cargoes are unpacked from a cargo container;
- (ii) tagging to each individual cargo with a smart tag, wherein the smart tags contain the details of the cargoes;
- (iii) registering and data processing of the cargoes using a plurality of electronic devices for registering and data processing of cargoes, wherein the electronic devices include personal Computers, laptops, computing devices and smart phones and the like;
- (iv) mounting a plurality of positioning/location sensors and imaging devices within the warehouse to enable locating and accessing of the cargoes, wherein the imaging device includes object recognition and OCR;
- (v) initiating data responders and transmitter for intercommunication of the smart tags and the electronic devices; and
- (vi) operating a central server for which the data/information on every cargo coming into the warehouse or CFS, stored therein and leaving the CFS are tracked which contained data on these cargoes and further updated with the location data of the cargoes, thereby the data relating to any cargo received

into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

8. The method of cargoes handling as set forth in Claim 7, wherein providing a dimensioning station to compute weight and volumetric measurement of the cargoes.

9. The method of cargoes handling as set forth in Claim 7, wherein electronic data relating to any cargo received into the CFS are immediately captured from cargo unstuffed from containers or as loose cargo coming into the CFS from exporters.

10. The method of cargoes handling as set forth in Claim 9, wherein additional data on each cargo in the warehouse are taken through photographs, with additional information on the cargo.

11. The method of cargoes handling as set forth in Claim 7, wherein when the cargo leaves the warehouse, the electronic updated data of the cargo are also electronically transferred to another party in a supply chain.

12. The integrated warehousing information and management system as set forth in Claim 1, wherein the dimensioning station allows measurements of the weight and volume of the cargo to be taken, and a plurality of photographs of the cargo are also taken.

13. The method of cargoes handling as set forth in Claim 7, wherein the cargoes are tagged and the details of the cargoes are affixed to the exterior of the cargoes, by means of a plurality of smart tags.

14. The method of cargoes handling as set forth in Claim 13, wherein the smart tags are affixed onto the exterior of each cargo to allow continuously tracking of the cargo within the warehouse.

15. The method of cargoes handling as set forth in Claim 7, wherein all data of the cargo including weight, volume, photographs, data on the cargo are also uploaded electronically and matched with existing data of the cargo into a server.

16. The method of cargoes handling as set forth in Claim 7, wherein the cargoes within the warehouse are being electronically tagged and tracked within the CFS or warehouse.

5 17. The method of cargoes handling as set forth in Claim 7, wherein a person holding an electronic device containing the data of the cargo is able to identify and locate each cargo accurately and precisely.

10 18. The method of cargoes handling as set forth in Claim 7, wherein any access to the data of the cargo is provided either through a hand held devices including smart phones, tablets and laptops.

15 19. The method of cargoes handling as set forth in Claim 7, further comprising the step of tagging cargoes with an electronic transmitter to ensure the cargoes are accurately positioned and are easily being located by a warehouse staff.

20 20. The method of cargoes handling as set forth in Claim 19, wherein a warehouse staff scans the smart tag affixed to a cargo to obtain all data relating to the cargo in real time and instantly.

21. The method of cargoes handling as set forth in Claim 20, wherein the warehouse staff includes forklift operators, and delivery clerks by using a tablet installed in a forklift.

25 22. The method of cargoes handling as set forth in Claim 21, wherein the warehouse staff is able to verify the details of the cargo in case of doubt in any instant.