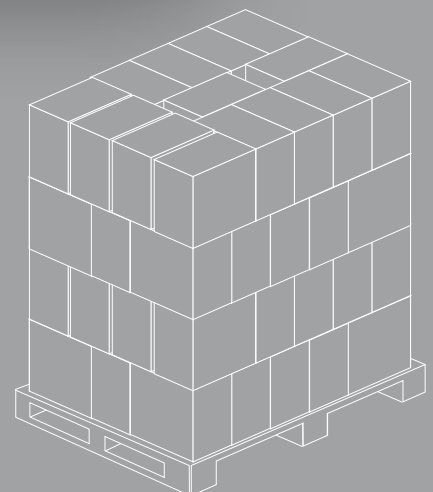
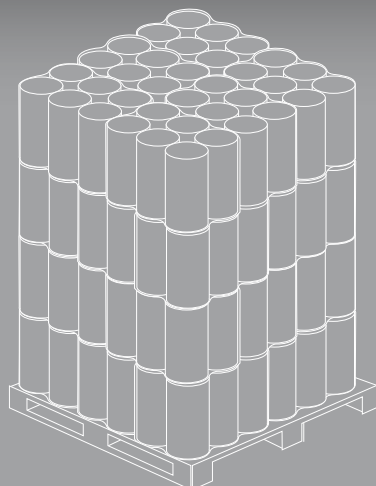
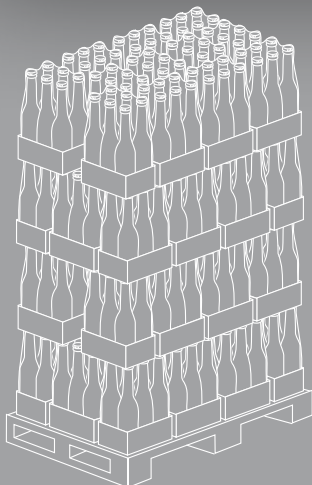


# Palletising and layer forming

Comparing technologies for end of line automation  
in the packaging industries for all consumer goods sectors



**Text by** Manuel Bolzoni, Gabriele Folli, Vincent Bandini, Glauco Cima, Alessandro Barbacini



## Machine series

OCME designs, manufactures and installs filling, packaging, palletising and handling machines for all the major mass consumer product manufacturing sectors. OCME machines are the result of decades of experience and are designed to become the backbone of our Customers' production division.

High and low level depalletisers	<b>DORADO</b>
	<b>ANTARES</b>
Roll-fed labeller	<b>SAGITTA</b>
Level filler for beverages	<b>HYDRA</b>
In-line and rotary volumetric fillers	<b>LYNX</b>
In-line and rotary weight fillers	<b>LIBRA</b>
Shrink-wrap and tray-packers	<b>VEGA</b>
Wraparound packers	<b>ALTAIR</b>
Combined wraparound and shrink-wrap packers	<b>GEMINI</b>
High and low level palletisers with 90° infeed	<b>PERSEUS</b>
In-line high and low level palletisers	<b>ORION</b>
Robot palletisers	<b>PEGASUS</b>
Automated guided vehicles	<b>AURIGA</b>
Computerised control system	<b>ALBATROS</b>

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## Why palletise and how to do it in 2010

In the Olympic Games it is not the most beautiful and the strongest who are crowned but those who compete.

Aristotle (from Nihomachean Ethics)



alletising consists in placing boxes of products on a support, usually wooden (called, precisely, a pallet) in order to facilitate moving many products simultaneously without subjecting them to undue stress. The birth of palletisers, machines that stack the products on the pallets,

dates back to the second World War, when the American army had to move enormous amounts of goods towards Europe; the use of nets was thus replaced by more standardised units, which were therefore easier to insert into an integrated logistics system. Over the years, the pallet's original role as a logistic unit has evolved and pallets are increasingly being adapted to the world of modern distribution; aesthetics, functionality, smaller packages are only some of the aspects that influence the development of new palletisers and the connected auxiliary systems.

If we look at a modern-day palletising machine and compare it to one that dates back even only ten years, we may note significant differences which, in a sense, reflect the changes that have come about in consumer buying habits and consequently in distributor points of sale. The macro-trend of renewed environmental awareness indicates that the weight and quantity of packaging materials is bound to diminish in the future (the by-product of which are increased economic savings for packagers); this fact will therefore influence the fragility and instability mostly of primary containers, but it will also impact some types of multiple packages, which will become increasingly difficult to handle. Add to this the fact that distributors, such as discount stores, cash-and-carry stores, large wholesalers, and not only, are more and more often bringing an entire pallet of products onto the sales floor and, as a result, the pallet must also meet aesthetic requirements, mostly tied to the correct orientation of the labels (facing outwards) of the products positioned on the external-most rows on the pallet. Current palletisers are designed for this sort of use, they handle difficult products better and, operatively speaking, they are highly flexible in terms of both palletising patterns and format changes. Today, much more than in the past, the end of the line and palletisers in particular, must be considered strategic tools that can guarantee companies the possibility of dealing in the products that the market will demand in the future and, in many cases, is already now demanding.



## Comparing technologies: traditional palletisers



### **Perseus: traditional palletisers with high and low level infeed**

*Product infeed is at 90° with respect to the direction of translation of the layer.* The Perseus family of palletisers may well be considered the most traditional of all, in that it is based on a commonly used method for layer forming and handling. Perseus palletisers are defined 90° infeed palletisers because the products arrive perpendicularly with respect to the direction of layer translation, that is, with respect to the direction of movement of the pusher that transfers the layer of products onto the pallet. Palletisers with 90° infeed are generally smaller sized as compared to in-line palletisers.

### **Orion: in-line palletisers with low and high level infeed**

*Product infeed and layer forming take place along the same direction of movement.* This series comprises some of the fastest machines in the world and represents the ideal choice for various high-end applications. Unlike Perseus palletisers, product infeed and layer forming take place along the same direction of move-

ment. Unlike 90° palletisers, there is no downtime during the layer forming cycle, so the maximum machine speed is generally higher.

### **High and low level infeed: how to choose?**

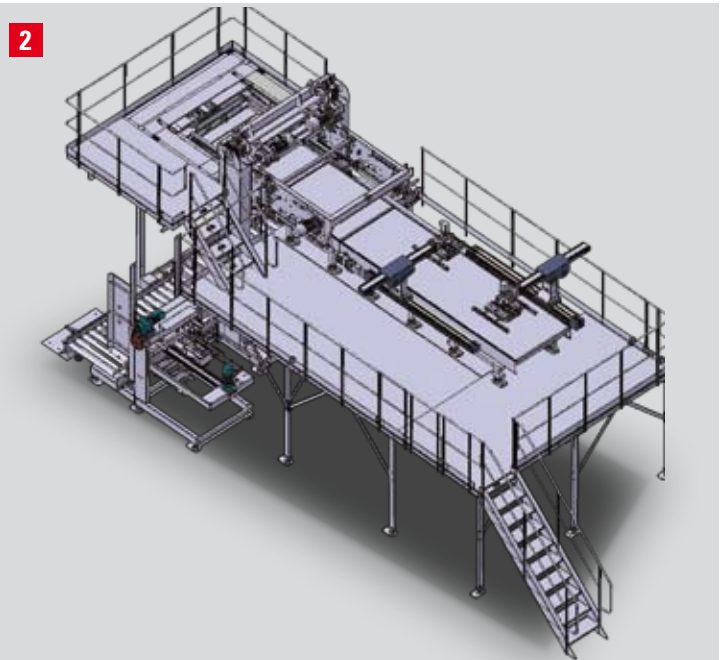
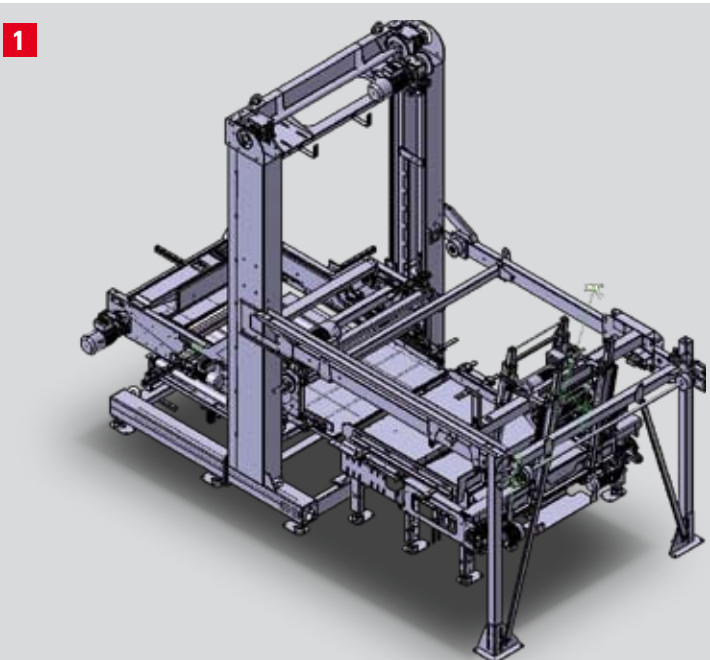
Choosing the type of pallet management, either high or low level, may be based on many variables. Without presuming to provide a definitive decision-making tool, the main features and advantages of the two alternatives are illustrated here following.

**High level:** high level infeed machines with mobile pallet allow for greater productivity. Layer forming and, therefore, the final part of the route followed by the products, takes place overhead, leaving free passage areas before the palletiser. This type of machine layout allows for superior optimisation of ground space.

**Low level:** low level palletisers are usually more accessible than high level palletisers. All man-machine interactions, for maintenance or any other activity on board the machine, are facilitated by the fact that the machine is at ground level. This also ensures better machine visibility on behalf of the operators, who do not have to change level to inspect the machine during the normal operating cycle.

**Figure 1**  
Perseus palletiser  
with 90° infeed

**Figure 2**  
Orion palletiser  
with in-line infeed









## Comparing technologies: robot palletisers



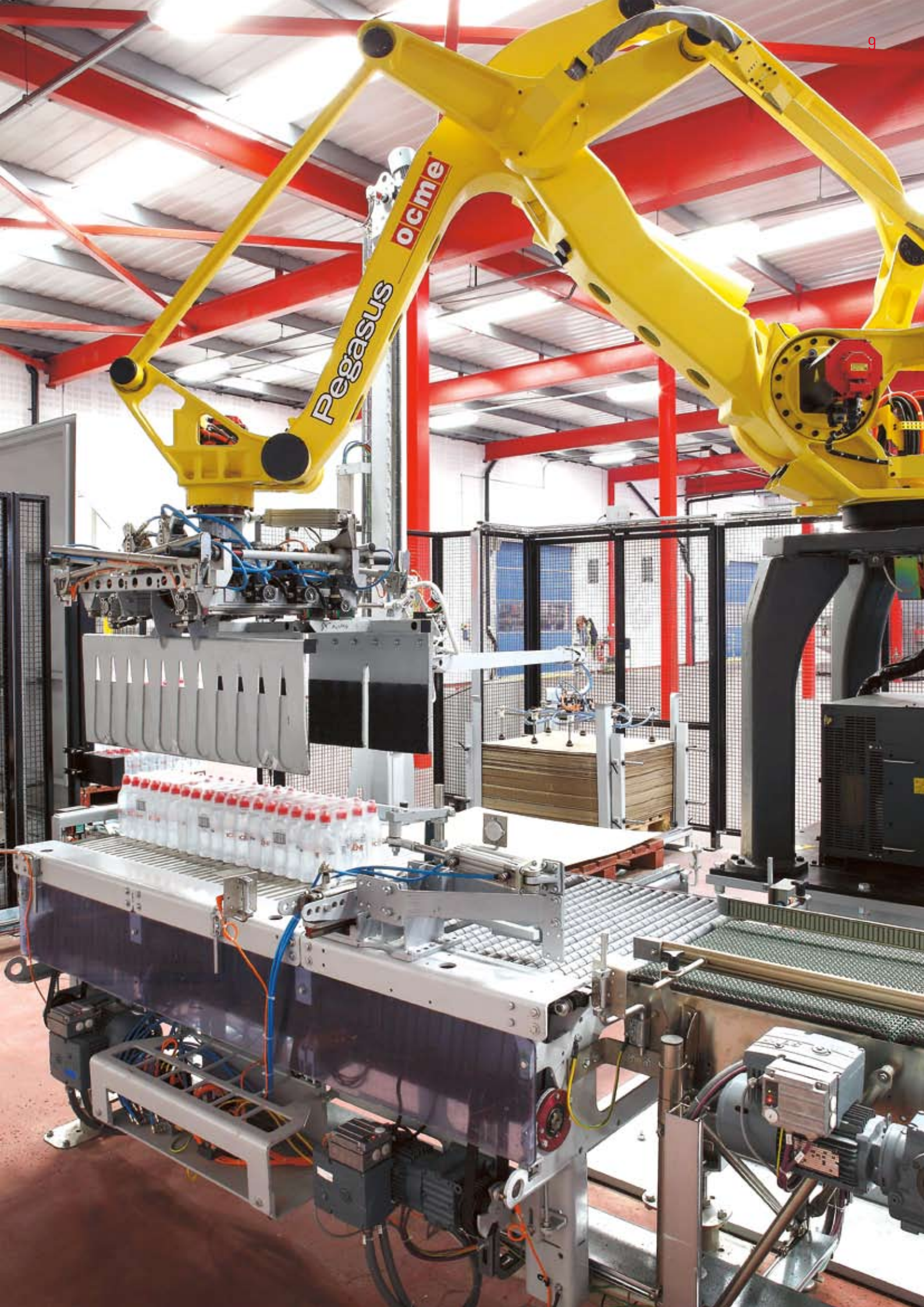
### **egasus: robot palletiser**

Robot palletisers are machines that derive from the automobile industry and are designed to simulate the human arm for complex and precise handling tasks. While the structure of the robot is a commercial product, the “hand”, or gripping head, is the feature that differentiates the models of the various manufacturers of robot palletisers. OCME holds various patents in this field, especially for the layer gripping head, that is,

a powerful automatic hand that can handle an entire layer of products at a time. Compared to traditional palletisers, such as Orion and Perseus, robot palletisers offer superior flexibility, as they can adapt to format changes, product changes and sometimes also line layout changes, simply by acting on the software. OCME provides the ProgramMaker software that allows the customer to personally re-programme the robot to create new palletising patterns based on customer-specific requirements.







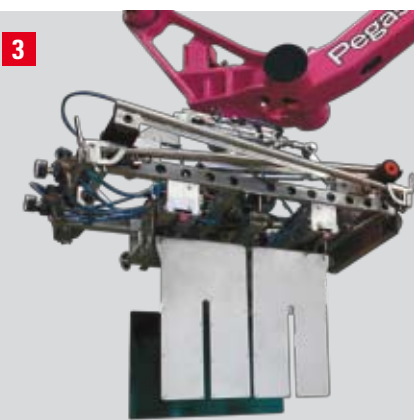


## Ocme added value: the gripping head



OCME has a vast line of applications for its robotic gripping heads. Each solution is specifically designed for the most efficient handling of the type of product requested. The facing page illustrates some of the gripping heads manufactured by OCME:

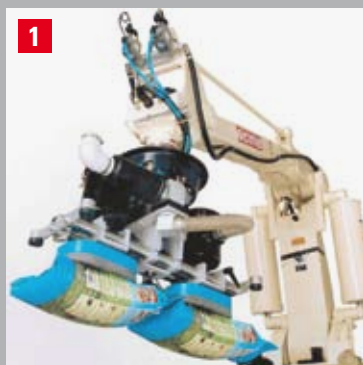
- 1** Gripping head with 2 suction devices for plastic Pet food bags
- 2** Row gripping head with split external plate to grip 1 or more cartons based on the pattern
- 3** Pallet integrity control system (upper and lower axes)
- 4** Complete layer gripping head for tissue packages
- 5 - 6** Gripping head for loose bottles: the same gripping device can pick up pallets, take the bottles and deposit them on plastic trays and deposit the trays with the bottles on dollies
- 7** Robots for layer forming (package rotation and positioning)
- 8** Detail of the pallet picking device mounted on a layer gripping head
- 9** Row gripping head as it positions a pack on its side
- 10** Layer gripping head for bundles, cartons or cases, with self-adjusting pneumatic plates for maximum safety during transfers
- 11** Layer gripping head with suction cups
- 12 - 13** Comb gripping head for pet food bags or bundles
- 14** Automatic replacement of the gripping head
- 15** Row gripping head for cartons
- 16** Gripping head for 1 kg packs of flour or sugar for display pallet complete with suction cups for layer-pad gripping
- 17** Gripping head equipped with telescopic arms for pallet and layer-pad gripping
- 18** Row gripping head for bundles
- 19** Layer gripping head for bundles
- 20** Row gripping head for bundles of shampoo packs



**Figure 3**  
Example of a row gripping head

**Figure 4**  
Example of a layer gripping head







## Palletising stages



he palletising process includes various stages, each of which is indispensable to obtain a pallet on which the product is positioned according to specific requirements:

- Product metering
- Product rotation
- Layer forming
- Compacting
- Pick-up and deposit

### Metering the packages

Package metering is used to space and count the products (boxes, bundles, loose products, etc.) to be palletised. The items to be palletised move towards the palletiser from an accumulation area along a system of conveyors that leaves an appropriate space between one item and another and subsequently makes it possible to count the items.

Products may be handled singly (product by product) or in batches. The latter solution contributes to a significant increase in productivity and reduces the speed of forward movement of the product; on the other hand, working by rows of products does not permit positioning each row specifically.

The heart of the metering section consists in a system with two (or three) belt conveyor segments that run at different speeds. There are 3 different package metering systems designed based on the stability of the product being handled.

#### Double metering belt with 1 motor

Fixed speed ratio between the two belts (usually 1:2) to create a space equal to the size of the package. This system is usually used to count packages and leave the space needed for rotation.

#### Double metering belt with 2 motors

Variable speed ratio between the two belts, to optimise system performance. This system is used to count packages and leave the space needed for rotation. The system creates the minimum space needed, based on the palletising pattern (ex. for non-rotated objects, the space required is less than that needed for objects that have to be rotated, thereby allowing higher speeds).

#### Triple metering belt with 2 brushless motors

Fixed speed ratio between the first 2 belts powered by 1 brushless motor. The third section of the belt is powered by 1 independent brushless motor. This system is used to count the packages and leave the space required for rotation. Maximum feeding precision. No collisions between packages at machine stops.



**Figure 5**  
Two, dual-belt infeeds with  
motorised, automatically  
adjustable lateral guides

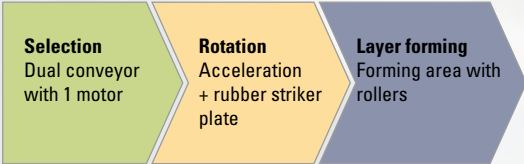
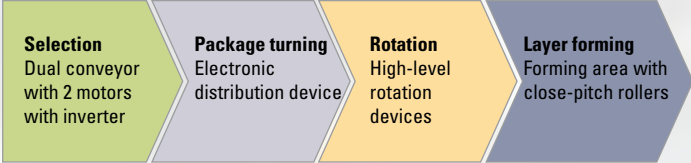
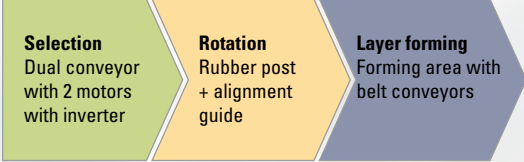
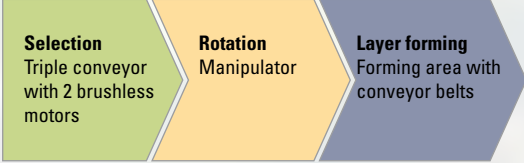
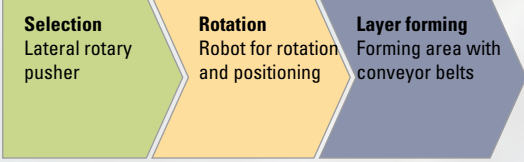


## Possible infeed configurations

The palletising pattern is usually formed in 3 stages, requiring the work of:

- the packaging metering (or selection) device
- the package rotation (and orientation) device
- the layer forming area.

The combination of these 3 elements varies based on package characteristics and line speed. Following are some examples of how OCME deals with the problem:

Type of infeed	Pattern	Applicable to	Ideal for
<b>Roller infeed</b>		Perseus, Pegasus	Stable packages
<b>With divider</b>		Perseus, Orion, Pegasus	Stable packages, high speed
<b>With conveyors + fixed rotation</b>		Perseus, Orion, Pegasus	Unstable packages
<b>With conveyors + manipulators</b>		Perseus, Orion, Pegasus	Unstable packages, fragile packages
<b>Tissue</b>		Pegasus	Tissue roll display









## Package rotation

The package rotation stage turns the products so that they are arranged according to a specific requested configuration. Package rotation is principally required in order to:

- optimise stability
- optimise the no. of products / layer
- optimise package facing (visibility of the product name on the pallet): especially important if the pallet is also the display case for the product (hard discount).

The simplest turning system is by means of "collision" with a fixed point of reference. This system is extremely functional at relatively low speeds and with containers that are not fragile. To mediate these limitations, Ocme "collision" systems are equipped with a pneumatic shock-absorbing system complete with pressure control, in order to ensure less traumatic product impact.

For high speeds and fragile containers, the turning stage is managed by means of more evolved solutions, which, based on the specific requirements, may comprise 3-axis manipulators or robots. The choice of one system over another or of combined systems varies according to the variables taken into consideration during the design stage and/or specific customer needs. Here below are the most commonly used package turning systems.

### Low level rotation for roller conveyor infeed (Figure 6)

- Rubber striker plate, with pneumatic shock absorption to absorb collision impact
- Standard rotary accelerator useful for large-sized packages

### Low level rotation for belt conveyor infeed (Figure 7)

- Rubber striker plate, with pneumatic shock absorption to absorb collision impact
- Alignment guide to complete the turning stage and keep the package in the correct position

### Rotation using 3-axis manipulators (Figure 8)

Packages are turned and positioned using 1, 2 or 4 manipulators, based on system configuration. Huge benefits in terms of:

- Maximum package stability
- Collision-free turning
- Extremely precise handling and positioning thanks to the linear brushless motor driven axis
- Package handling (turning and sideways transfer) occurs without abrupt speed increases following the movement of the conveyor belt, thus avoiding friction that may damage the base of the packages (ex. thin-film bundles and bottles with PET bottom)
- Possibility of working as a divider thereby increasing speed per single infeed
- Automatic format change for packages with leading side measuring between 130 and 400 mm
- Height adjustment up to 400 mm
- Possibility of handling batches with different lengths

### Rotation using robots (Figure 9)

- Maximum package stability
- Collision-free turning
- Extremely precise and fast handling and positioning

### Patented electronic distributing device (Figure 10)

- Infinite positioning possibilities for outgoing packages, thanks to encoder-controlled translating guides that can send the packages in the desired direction with no limitations
- Variable speed based on package size and type and on the palletising pattern, in order to optimise system performance
- Automatic format change from the operator panel
- Connection conveyor between the distribution device and the layer forming conveyor belt for greater stability

### High level rotation (Figure 11)

- Rotation plates with a pneumatic system for shock absorption, enabled from above
- Pneumatically adjustable absorption pressure level, based on package fragility
- Easy format change thanks to fixed reference points on the main frame

**Figure 12**  
Robot palletiser for 20 litre cans

## Layer forming

Once the packages or batches are facing in the right direction, based on the requested palletising pattern, they must be arranged and lined up to form the layer.

### This may be done:

- in-line
- at 90°

with respect to the direction of forward movement of the containers. Due to their technical and construction characteristics, In-line systems are generally preferable for high frequency outputs, while 90° systems are best for medium/low production.

## Layer forming on a rollerway

The most tradition layer forming system uses separators (or dividers) against which the product stops in a specific position, depending on the required layer layout. These dividers, driven by pneumatic cylinders, rise from the lower part of the rollerway along which the products move; the smaller the diameter of the rollers, the greater the number of dividers that may be installed and, hence, the greater the possibility of positioning the product as desired. As the palletising patterns increase and/or with very complex configurations, the greater number of dividers required and, therefore, the larger space needed to allow them to raise, increases the size of the un-squared layer.

During transfer, the layer, which is not sufficiently squared, may fall apart and require external, manual adjustment. Introducing palletising patterns not provided for during machine design often requires new mechanical parts and the presence of a specialised technician for installation. In any event, this type of palletiser with divider continues to play an important role, as it represents a cost-efficient and effective solution where high speeds and numerous palletising patterns are not required. OCME has improved this type of solution by improving rollerway motorisation: toothed belts act on every single roller and do not require continuous tightening; moreover, proper rollerway functioning will not be compromised if one belt breaks.

## Layer forming on step-by-step belt conveyor

A more recent and efficient solution, to respond to increasing demands regarding the number of palletising patterns and palletising speed, involves the use of a step-by-step belt conveyor, eliminating the need for dividers. Thanks to a system of belts driven by brushless motors, the products are aligned to form the layer without the use of dividers, but using only the motion of the belts themselves. This solution does away with the problem of products bumping into the dividers or one another. Moreover, any new palletising patterns may be introduced by adjusting the necessary parameters, without requiring additional mechanical and/or electronic parts. This forming system is now a consolidated solution in OCME machines.

### Additional advantages of this system:

- Easy and reduced maintenance;
- Reduced pneumatic consumption (for systems with dividers, the consumption is caused by the cylinders);
- The creation of new patterns without having to add components;
- The customer may create personalised patterns after a brief training period.



**Figure 13**  
Palletiser for 200 litre drums







## Layer forming using manipulators



### Layer forming using manipulators

The need for increasingly flexible systems in terms of the types of products to be palletised, the presence of increasingly fragile products and, lastly, the need for increasingly higher performance levels, have led to the widespread use of devices called manipulators. OCME manipulators are designed to provide high-performance infeed for all types of palletisers: 90° palletisers, in-line palletisers and robot palletisers. The task of the manipulator is precisely that: to manipulate the product (translate and turn the product) to form and compact the layer at high speeds, reducing collisions and stress to a minimum, especially for fragile or unstable products. The OCME solution takes a modular approach and is very compact-sized: only 3 metres long but with sufficient installation space for four manipulators. Systems designed for two manipulators may be upgraded subsequent to installation by adding two more manipulators to increase productivity. This system is designed to provide greater reliability even in critical situations, such as transient line start-ups and stops and unforeseen machine stoppages. Infeed is composed by a triple-section belt conveyor driven by two brushless motors. This means:

- maximum feeding precision;
- no collisions between packages in case of machine stops;
- recovering empty spaces created in case of sudden stops.

Special attention has been paid to the passage from one section of the conveyor to another so as to avoid compromising the stability of small packages.

A significant and unique feature of Ocme manipulators is the accessibility of every area of the system: if needed, the operator can access any point of the machine and intervene in absolute safety.

### Some features of OCME manipulators include:

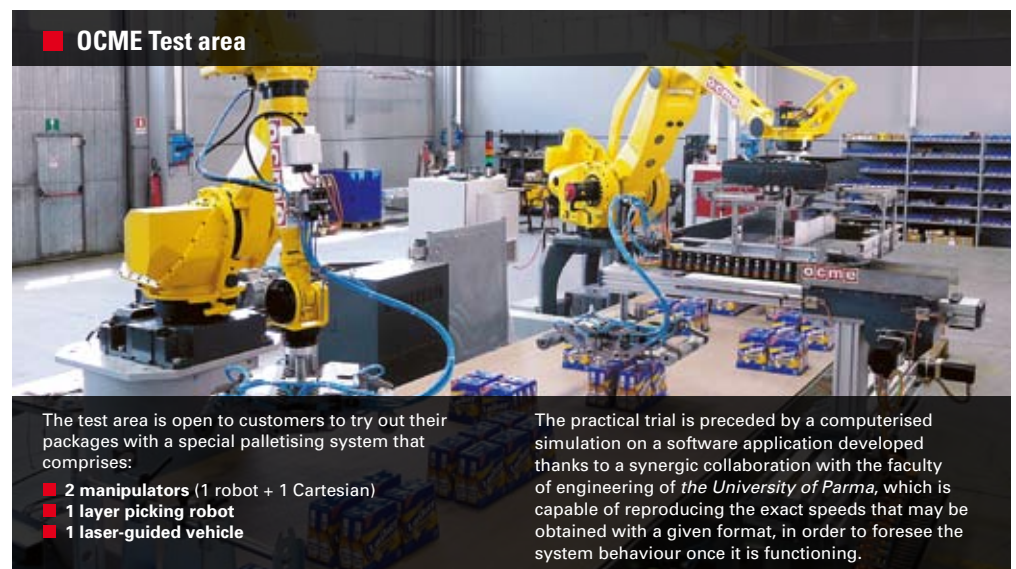
- The manipulator works only on two axes: sturdier structure and reduced maintenance.
- A specific and independent PLC for the layer forming area controls the conveyor and manipulator brushless motors.
- The manipulator is fixed to a solid frame that is built to effectively absorb vibrations.
- Belt conveyor width has been studied to avoid interference between two facing manipulators.

### Manipulator features

- Self-centring gripper for maximum precision in positioning packs and bundles of packs.
- No size adjustment required for pack formats between 130 and 400 mm (front side leading).
- Height adjustable up to 400 mm.
- Can handle different bundle lengths
- Maximum pack weight: 24 kg.

**Figure 14**  
The manipulator moves on a sturdy structure, avoiding vibrations

**Figure 15**  
The manipulator gripper is self-centring and its height may be adjusted up to 400 mm



The test area is open to customers to try out their packages with a special palletising system that comprises:

- 2 manipulators (1 robot + 1 Cartesian)
- 1 layer picking robot
- 1 laser-guided vehicle

The practical trial is preceded by a computerised simulation on a software application developed thanks to a synergic collaboration with the faculty of engineering of the University of Parma, which is capable of reproducing the exact speeds that may be obtained with a given format, in order to foresee the system behaviour once it is functioning.



## Principle solutions available

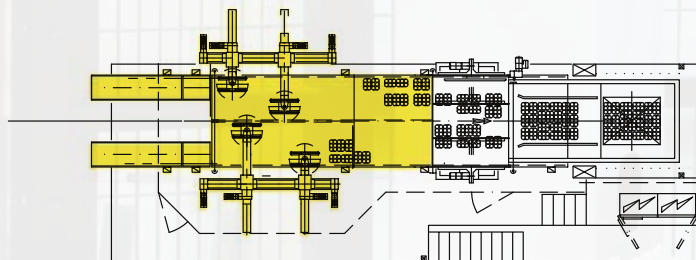
Type	Cartesian	Gantry	Robotic
No. of axes	3	4	5/6
No. of infeeds	1/2	1/2	1/2
Batch forming	Yes	Yes (with rotating pusher)	Yes
Type of gripper	Self-centring and rotating	Self-centring	Motorised rotating self-centring Motorised, parallelogram layout
Step-by-Step	Yes	No	Yes
Accessibility	High	Low	Medium to high
Space requirements	Compact-sized	Large	Compact-sized
Possibility of assembly from above	Yes		Yes with robot base on the ground
System simplicity	High	Low	Medium-high
Supplied by OCME	Yes	No	Yes

### Some possible applications of Ocme manipulators

#### Orion with 4 manipulators

In-line high level palletiser with two infeeds and turning and layer forming system with 4 manipulators.

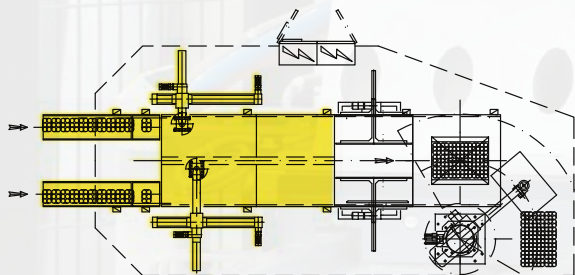
**Max speed:** up to 10 layers/minute.



#### Pegasus with 2 manipulators

Robot palletiser with in-line low level infeed and turning and layer forming system with 2 manipulators.

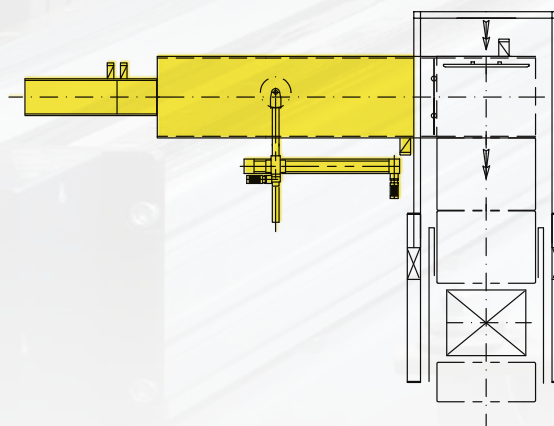
**Max speed:** up to 6 layers/minute.



#### Perseus with 1 manipulator

90° infeed low level palletiser with one infeed and turning system with 1 manipulator. Layer forming by means of a pusher.

**Max speed:** up to 5 layers/minute.



## Compacting, picking and/or depositing the layer

After the product layer has been formed and before it is picked up and placed on the pallet, the layer must be compacted. This operation varies based on the type of palletiser.

### Traditional palletisers

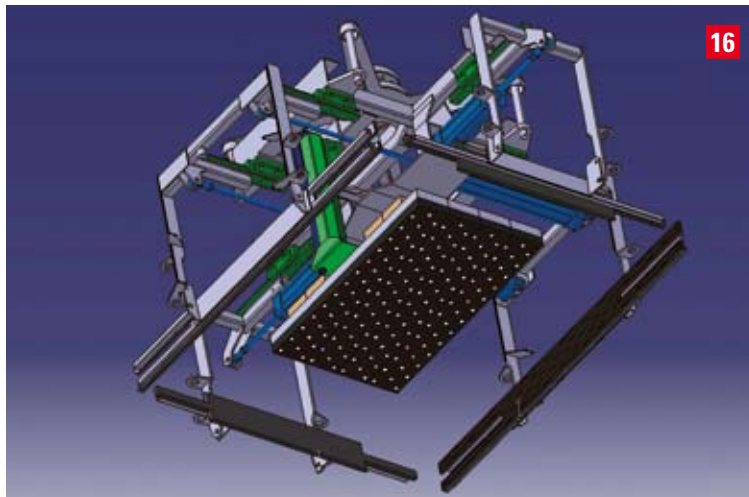
For traditional palletisers, the compacting system is composed of 3 individually motorised squaring bars that provide flexible layer compacting for different sized pallets without requiring manual adjustment.

### Robot palletisers with layer pick-up

For robots, Ocme has designed and patented a special gripper to improve the operational quality of the compacting, gripping and picking system. The gripper has 4 pneumatic perimeter bars but with an option to allow inserting plates inside the layer that have a high friction coefficient, which means that a lower gripping pressure is required to pick up, handle and deposit the layer itself. The parameters for the presence and position of the plates are set through the software, so no manual intervention is required.

Lastly, the final stage in layer forming is picking up and depositing the layer. Based on the specific application, OCME has designed and created three types of solutions:

- The first consists in a system that has two translating stripper tables, with a low friction coefficient and low wear rate, which open and close below the layer that must be deposited. The two-storey solution, as opposed to having just one level, means less strokes when opening and closing the table itself, which in turns means faster depositing times. Furthermore, the fact that the two tables move symmetrically outwards during deposit permits the creation of "chimney-stack" type patterns (that is, palletising patterns with "holes" between layers) without the use of special tools. As the tables are not very thick, the distance between the bottom of the layer, as it is being deposited, and the surface on which it is being deposited is rather small (approximately 20mm).
- The second system consists in the use of two so-called "apron" stripper tables with rollers (this system is the most used by the competition). The rollers have a 30 mm diameter so the distance between the bottom of the layer and the deposit surface is approximately 50mm. In critical cases, so-called depositing pens must be used.
- The last system, specifically for robots, consists in a special gripper patented by OCME and described previously. This gripper, eliminates product handling/movement time, such as the time required by traditional apron strippers, and considerably reduces cycle duration (approximately 6 cycles/min), thus optimising the layer compacting, pick up and deposit stages. Furthermore, as there is no support surface below the layer, the product may be released near the preceding one, ensuring maximum stability.



**Figure 16**

In some cases, the gripping head may be equipped with an auxiliary suction cup system (for ex., for cluster packages with a short cone shape, high-cones or tin cans). It is preferable in fact to pick up the layer not only from the sides, using the 4 side bars, but also from above using a drilled plate that vacuum-grips the package. In this way, less pressure need be exerted on the sides of the layer, thereby avoiding breakages due to packs falling and/or becoming deformed.





**Figure 17**  
Stripper table with a low friction coating, which may be opened in two halves.



**Figure 18**  
Oversized motors and lifting chains to guaranty maximum reliability over time.

## Secondary operations

Some operations that are complementary to palletising are carried out by accessory devices, such as:

- the layer-pad (cardboard sheets inserted in between the layers to increase product stability) insertion column
- the empty pallet dispenser.

### Automated layer-pad insertion column (AIC)

The purpose of this operation is to insert the cardboard layer pad correctly, in the least amount of time possible, without hindering the movement of the other machine parts such as, for example, the robot palletiser arm.

The new AIC column created by Ocme is driven by two brushless motors that guarantee accurate movement control and therefore a precise, interference-free synchronicity with the Pegasus robot: the robots may be pushed to high speeds without any risk of collision.

Furthermore, the brushless motors permit the AIC device to follow optimised trajectories when lifting/lowering and rotating the layer-pad gripping head.

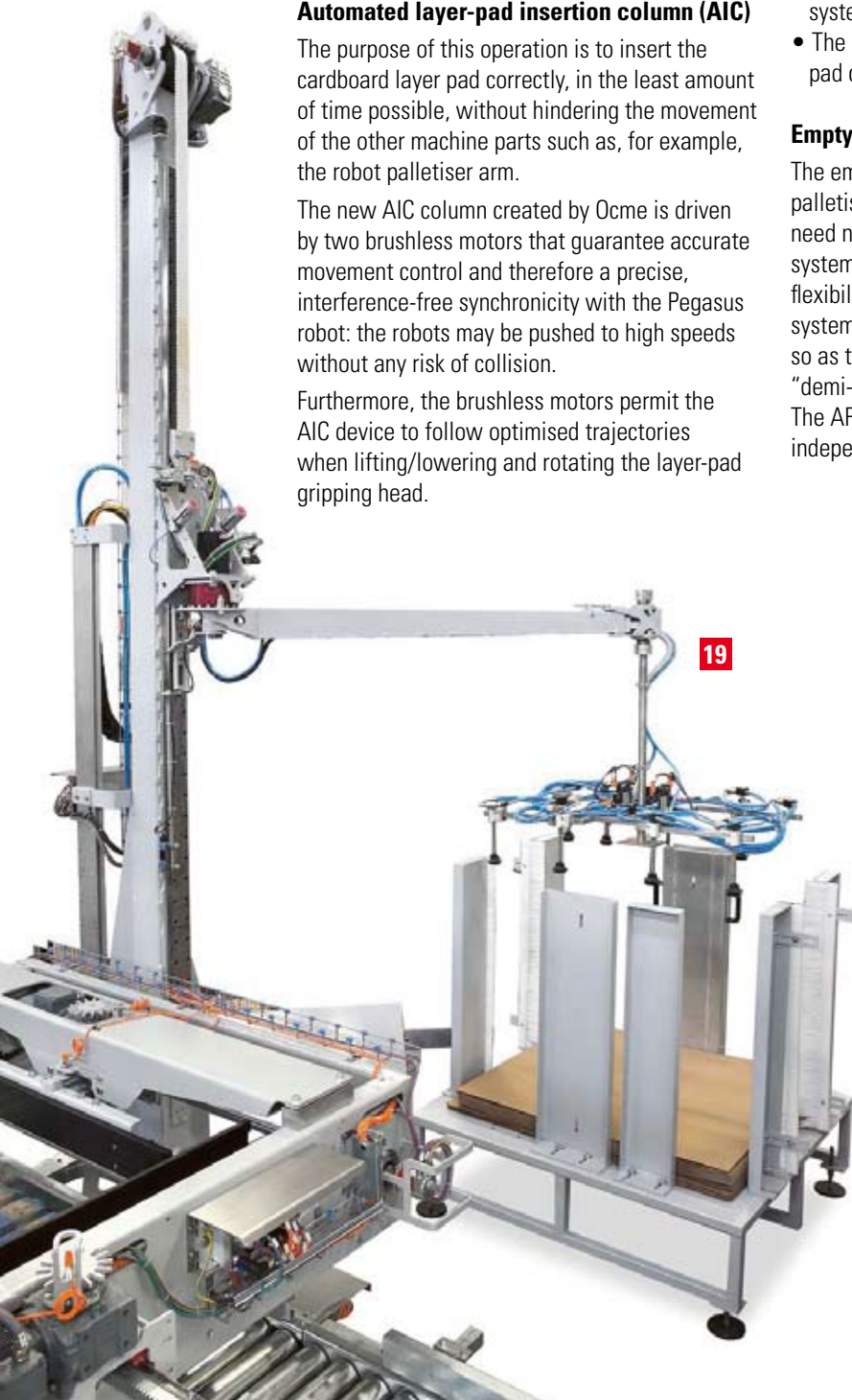
The AIC module is designed as an independent machine and is powered by its own electrical panel, with two advantages:

- It may be installed after the palletiser has already been installed, without the need for large variations to the system and with contained costs.
- The system may be inserted into any palletising system.
- The column may also be equipped with a layer-pad centring device.

### Empty pallet infeed (APNF)

The empty pallet infeed system supplies the palletiser with empty pallets, so that this task need not be carried out manually. The OCME system is designed to guarantee maximum flexibility in terms of variations in pallet size. The system may be used with 4 forks instead of 2, so as to be able to use half-pallets (also called "demi-pallets").

The APNF module is also powered by an independent electrical panel.



**Figure 19**  
High-performance column for layer-pad pick up and deposit.

**Figure on the following page**  
Row picking robot palletiser for mineral water bundles equipped with pallet gripping devices and integrated with a layer-pad column.







## End-of-line integration



**Figure 20**  
Pocket PC for laser-guided  
shuttle mission control.

**T**he palletising area is the heart of the end of the line. The overall efficiency of this important node, in terms of corporate production potential, depends on the perfect integration of all machine devices and on a correct engineering layout, as much as on the quality of the palletisers. In this field, OCME can pool on know-how acquired in over half a century of work in various merchandising sectors. Especially at the end of the line, many needs are transversal vis-à-vis the product handled by individual companies. Logistics, warehouse management and traceability are activities that call for growing degrees of automation in order to guarantee repeatability and total production control.

### LGV shuttles and pallet handling

Handling of loaded pallets may be carried out using Auriga laser-guided shuttles or shuttles on rails. Compared to handling by “human lift-truck operators”, Auriga shuttles offer a much higher safety level combined with an operating cost that is considerably lower even on the

medium-term. Auriga shuttles are available in various configurations and may therefore be perfectly adapted to the designated tasks, in terms of load capacity, type of product and also layout of the routes to be followed inside the production site. Laser-guided vehicles may operate in groups controlled by a centralised system that efficiently dispatches orders and missions to each unit.

Shuttles on rails may still be used to some advantage, even in the era of laser-guided shuttles, when the route to be followed with loaded pallets in relatively simple and not too far away from the palletiser. These shuttles are highly automated, although they do not benefit from the flexibility of laser-guided technology.

### Wrapping machines and hooding machines

OCME can integrate any brand of wrapping or hooding machine into the line, according to customer requirements. Pallet access to the wrapping area may be carried out by means of Auriga shuttles or using traditional pallet conveyors.



**Figure 21**  
Laser-guided shuttle for  
pallet pick up and deposit to  
and from the palletising and  
depalletising lines.



**Figure 22**  
End-of-line in an automated  
palletising system  
composed of 5 robots  
with two pallet wrapping  
machines.



### Warehouse management

The purpose of integrated warehouse management is to optimise merchandise storage and handling in the warehouse and in the parking areas.

When warehouse management is assigned to Auriga laser-guided vehicles, a powerful control system, the AGV manager, guides the vehicles through specific missions based on the load that the vehicles must deposit or pick up, according to a series of parameters, such as for example:

- the code of the product to be handled
- the presence of free areas or areas occupied by products with the same code
- the storage date

### Tracking

Product tracking is a field in which technologies and the integration of various operative environments can make the difference in terms of guaranteeing long-term repeatability. OCME develops tracking systems that can track products and batches and file the relative information. From low-level devices, such as labelling machines or ink-jet printers on the field, across conveyors and shuttles, right to the very heart of the control system, all technologies and every resource is monitored so as to provide corporate management with a scientific basis on which to found its tactics and strategic decisions.

### Data sharing and pervasiveness

In modern businesses, the role played by production data and information grows from day to day. Having access to the logs of each machine, being able to monitor production in-progress or give orders such as format changes or handling activities are tasks that until just recently required that an operator (often specialised for a specific machine) to intervene by means of special hardware and software, almost always on board the machine. For some time, OCME has been developing open systems that allow machines and packaging and logistics system to interface with normal company information technology infrastructures. These same interfaces are evolving and becoming increasingly simple, so as to be able to be used and become accessible not only through normal office PCs, but also through palm-held devices (PDA), as is already the case for Auriga vehicle controls. Therefore, data sharing and system control is increasingly being carried out on widespread standard platforms such as Ethernet networks, WiFi protocols and on non-specific devices so as to guaranty data shifting and updating.

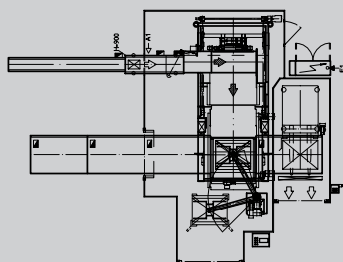


## Infinite configurations

The experience and the range of models of traditional and robot palletisers provide a multitude of possible configurations that may be adapted to specific packaging characteristics, to line speed and to plant layout requirements.

### System configurations for cartons, bundles, plastic crates, multipacks, loose bottles

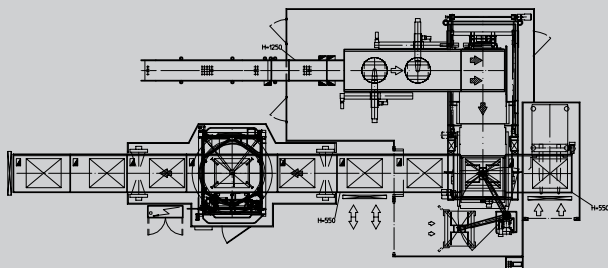
#### 1 PERSEUS LF1 with 1 infeed



**Characteristics:** Traditional palletiser with 1 low level 90° infeed. Package turning post with shock absorbing system. Row transfer by means of a pushing device. Configuration with layer-pad column.

**Suited to:** bundles, cartons, plastic crates, multipacks  
**Speed:** up to 5 layers/minute

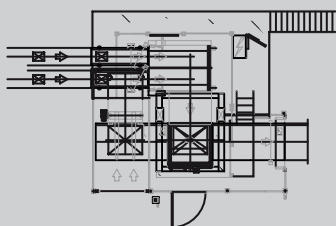
#### 2 PERSEUS LF1 with 1 infeed and 2 manipulators



**Characteristics:** Traditional palletiser with 1 low level 90° infeed and 2 robot manipulators for package orientation and turning. Row transfer by means of a pushing device. Configuration with layer-pad column and pallet wrapping machine.

**Suited to:** bundles, cartons, plastic crates, multipacks  
**Speed:** up to 5 layers/minute

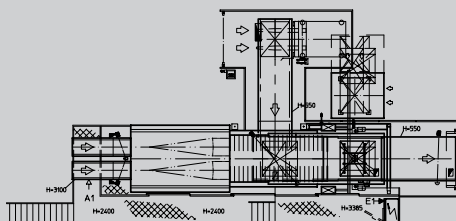
#### 3 PERSEUS HM2 with 2 infeeds and pusher



**Characteristics:** Traditional palletiser with 2 high level 90° infeeds. Row transfer by means of pushing device. Configuration with layer-pad trolley.

**Suited to:** bundles, cartons, plastic crates, multipacks  
**Speed:** up to 8 layers/minute

#### 4 ORION HM2 con 2 infeeds and separator



**Characteristics:** Palletiser with 2 in-line high level infeeds, and electronic divider for package positioning. Package turning posts with impact-control shock absorbers.

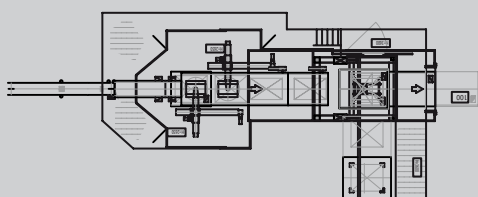
**Suited to:** bundles, cartons, plastic crates, multipacks  
**Max. speed:** up to 10 layers/minute.



5

**ORION HM**

with 1 infeed and 2 manipulators



**Characteristics:** Palletiser with 1 in-line high level infeed and turning and layer forming system with 2 manipulators. Layer-pad transfer trolley.

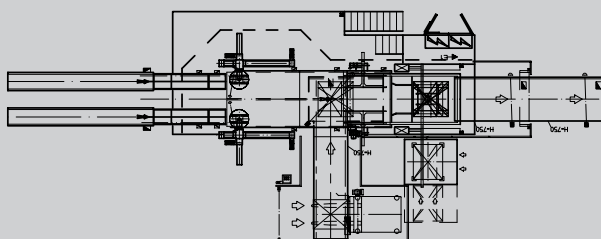
**Suited to:** bundles, cartons, plastic crates, multipacks

**Max. speed:** up to 10 layers/minute.

6

**ORION HM**

with 2 infeeds and 2 manipulators



**Characteristics:** Palletiser with 2 in-line high level infeeds and turning and layer forming system with 2 manipulators.

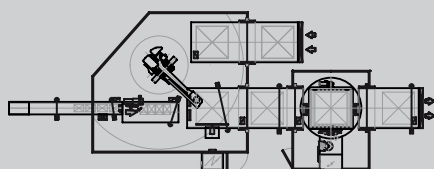
**Suited to:** bundles, cartons, plastic crates, multipacks

**Max. speed:** up to 10 layers/minute.

7

**PEGASUS M160**

Robotic island for 1 product code



**Characteristics:** Robot palletiser with multiple gripping system. Gripping head equipped with a pallet and layer-pad gripping device. Configuration with wrapping machine.

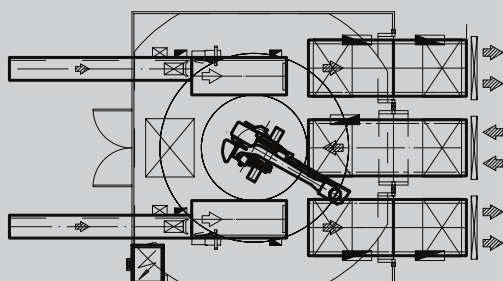
**Suited to:** bundles, cartons, plastic crates, multipacks

**Max. speed:** up to 3 layers/minute without interruptions (pallet change)  
up to 2 layers/minute with interruptions (pallet change)

8

**PEGASUS M160**

Robotic island for 2 product codes



**Characteristics:** Robot palletiser with multiple gripping system. Gripping head equipped with a pallet and layer gripping device. Can handle 2 products simultaneously.

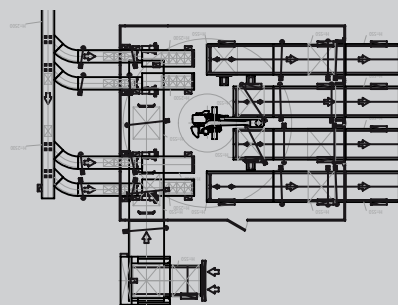
**Suited to:** bundles, cartons, plastic crates, multipacks

**Max. speed:** 10.5 cycles/minute

9

**PEGASUS M 160**

Robotic island for 4 product codes



**Characteristics:** Robotic palletising island capable of handling 4 product codes simultaneously.

Robot equipped with multiple gripper to grip packages and pallets.

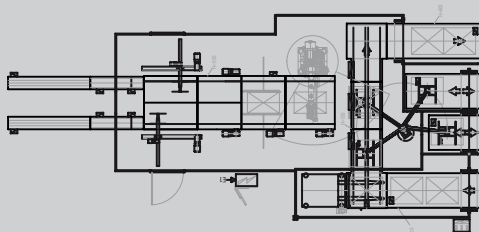
**Suited to:** bundles, cartons, plastic crates, multipacks

**Max. speed:** up to 7.5 cycles/minute

10

**PEGASUS F450**

Robotic island for layer gripping with manipulators



**Characteristics:** Robot palletiser with 2 in-line infeeds and 2 manipulators.

Configuration with layer-pad column and pallet magazine.

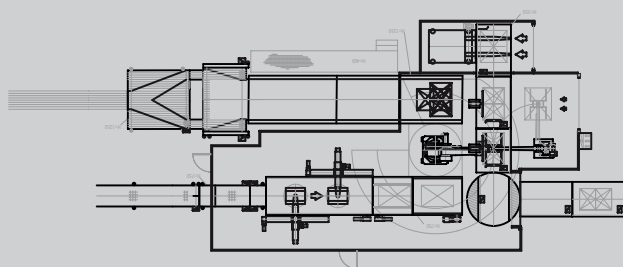
**Suited to:** bundles, cartons, plastic crates, multipacks

**Velocità:** up to 6.5 layers/minute

11

**PEGASUS F450**

Layer gripping root for bundles and loose products



**Characteristics:** Robot palletiser with complete interchangeable layer gripper for loose bottles or bundles. Bundle infeed with belt conveyor and 2 manipulators for layer forming. Loose products infeed with layer channelled preparing system. Automatically interchangeable gripping head. Layer-pad insertion column.

**Suited to:** loose bottles, bundles, cartons, plastic crates, multipacks

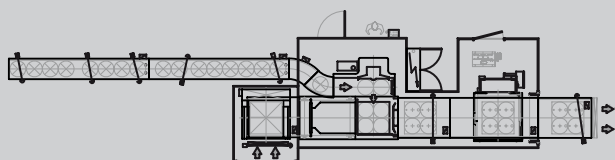
**Max. speed:** up to 6.5 layers/minute.

## System configurations for drums and pails

12

**PERSEUS F**

For 60 and 200 kg drums



**Characteristics:** Traditional palletiser with 1 low level 90° infeed. Row transfer by means of pushing device.

Configuration with banding machine.

**Suited to:** metal or plastic drums

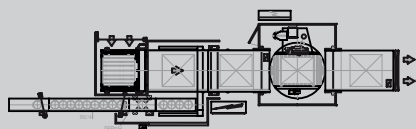
**Speed:** up to 2 layers/min



13

**PERSEUS F**

For 20 kg drums



**Characteristics:** Traditional palletiser with 1 low level 90° infeed. Row transfer by means of pushing device.

Configuration with strapping machine.

**Suited to:** metal or plastic drums and pails

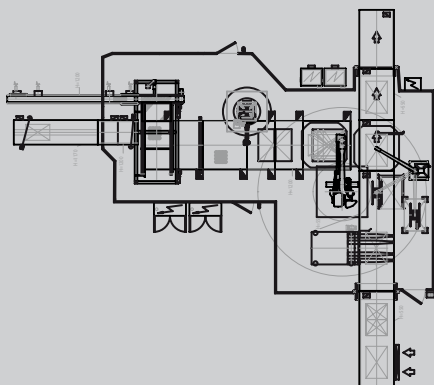
**Speed:** up to 2.5 layers/min

### System configurations tissue packages (loose, boxes and bags)

14

**PEGASUS F450**

Robotic island for tissue



**Characteristics:** Robot palletiser with layer grippers.

Layer forming system for loose products with side pusher and robot for package positioning and orientation. Boxes and bags may be handled by the same system.

Configuration with tray former and layer-pad insertion column.

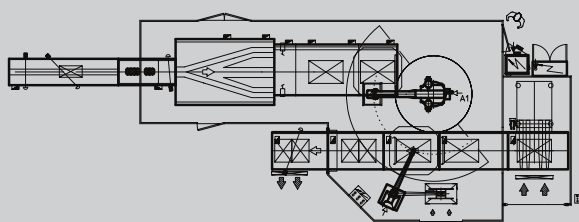
**Suited to:** tissue products (loose, boxes and bags)

**Max. speed:** up to 6 layers/min

15

**PEGASUS F450**

Robotic island for tissue



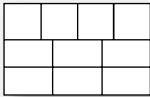
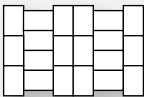
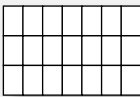
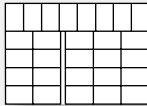
**Characteristics:** Robot palletiser with layer gripper. Layer forming system with single infeed and divider from one to more than one row.

The machine is equipped with an empty pallet magazine and layer-pad dispenser column.

**Suited to:** tissue products (boxes and bags)

**Max. speed:** up to 6 layers/minute

Table of peak speeds for: cartons, bundles, plastic crates, multipack, loose bottles (speed expressed in packs/minute)

No. of packs / layer		10	20	21	28	Typical sectors of application
Pattern						
Package sizes		400 x 300 H=300	270 x 180 H=300	270 x 180 H=300	220 x 140 H=300	
1	<b>Perseus LF1</b> With 1 infeed	40	50	60	60	Beverages, Food, Petrochemical, Detergents
2	<b>Perseus LF1</b> with 1 infeed and 2 manipulators	38	50	65	65	Beverages, Food
3	<b>Perseus HM2</b> with 2 infeeds and pusher	65	90	94	95	Beverages, Food, Petrochemical, Detergents, Tissue
4	<b>Orion HM2</b> With 2 infeeds and divider	90	150	175	185	Beverages, Food
5	<b>Orion HM</b> With 1 infeed and 2 manipulators	45	55	75	72	Beverages, Food
6	<b>Orion HM</b> with 2 infeeds and 2 manipulators	90	100	155	115	Beverages, Food
7	<b>Pegasus M160</b> Robotic island for 1 product code	33	36	55	42	Beverages, Food, Petrochemical, Detergents, Tissue
8	<b>Pegasus M 160</b> Robotic island for 2 product codes	30	32	60	52	Beverages, Food, Petrochemical, Detergents, Tissue
9	<b>Pegasus M160</b> Robotic island for 4 product codes	22	24	45	40	Beverages, Food, Petrochemical, Detergents, Tissue
10	<b>Pegasus F450</b> layer gripper robotic island with manipulators	65	100	136	115	Beverages, Food
11	<b>Pegasus F450</b> Layer gripper robot for bundles and loose products	45	55	75	72	Beverages

Note: the data provided are purely indicative. Please contact the OCME technical office for a correct analysis of your project.



Table of peak speeds for: drums, small drums, pails

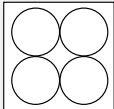
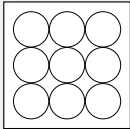
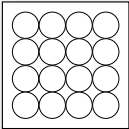
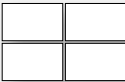
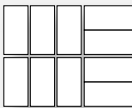
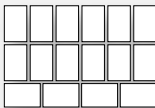
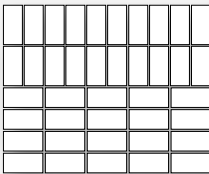
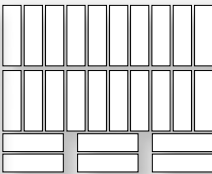
No. of packs / layer		4	9	16	Typical sectors of application
Pattern					
Package sizes		200 kg Ø 600 h 900 mm	60 kg Ø 400 h 580 mm	20 kg Ø 300 h 450 mm 8 drums/min	
12	<b>Perseus F</b> For 60 and 200 kg drums	8 drums/min	10 drums/min	-	Petrochemical
13	<b>Perseus L</b> For 20 kg drums and pails	-	-	12 drums/min	Petrochemical, Paints, Food

Table of peak speeds for: tissue packages (loose, boxes, bags)

No. of packs / layer		4	10	16	40	26	Typical sectors of application
Pattern							
Package sizes		Sacks 600 x 500 mm	Bundles 4x2x2 480 x 240 x h 220 mm	Bundles 3x2x2 300 x 200 x h 200 mm	Display 2x1x2 240 x 120 x h 220 mm	Display 3x1x3 360 x 120 x h 330 mm	
14	<b>Pegasus F450</b> Robotic island for tissue – loose and bundles	24 packages / min	40 packages / min		156 packages / min	100 packages / min	Tissue
15	<b>Pegasus F450</b> Robotic island for tissue – bundles	24 packages / min		90 packages / min			Tissue

Note: the data provided are purely indicative. Please contact the OCME technical office for a correct analysis of your project.

## OCME's Strategy for reducing costs on our equipment range for low production levels

### Simplified machine Design

OCME has developed a range of palletisers specifically for low speeds which cost considerably less than in the past. This has been made possible by a rationalisation of the production process which has resulted in both economic advantages for the customer and also reduced times for delivery, installation and testing.

The following innovations have led to a reduced selling price:

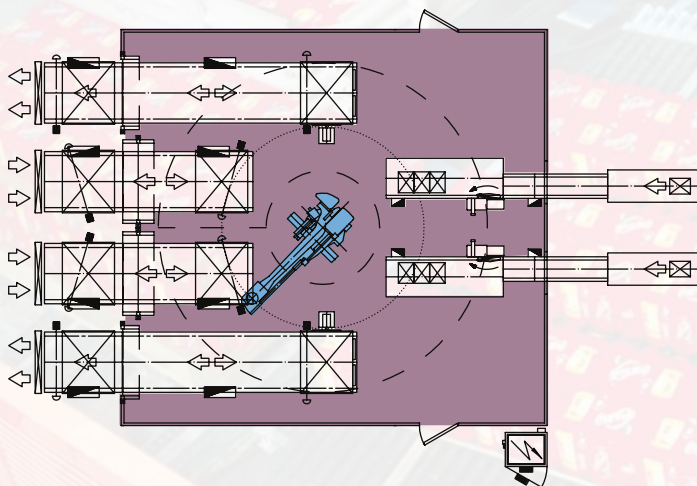
- Pre-assembled and pre-tested units
- Pre-wired electrical cables ready for immediate installation
- Reduced design and installation times
- Reduced commissioning times
- High quality components and materials
- "Plug & play" concept to reduce the number of hours used for installation and testing.

## Pegasus<sub>zero</sub>

### "Plug and Play" Robot Island

Ideal for companies which need to handle two different product codes simultaneously, this system takes advantage of robotic unit technology to the full, using standardized hardware and software components where possible.

Speed: up to 10.5 cycles / minute (configuration as per drawing, 2 different product codes)  
up to 12 cycles / minute (configuration for 1 product)



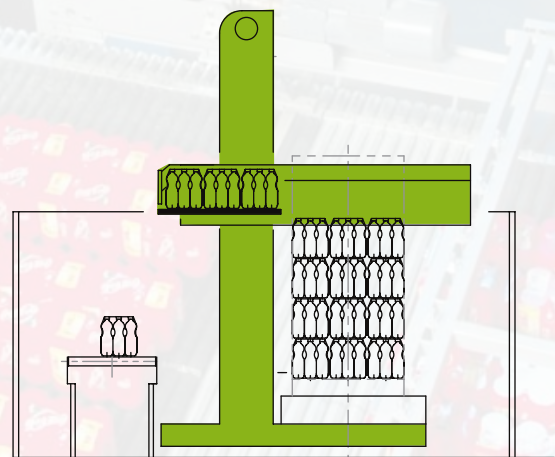
Example of palletising robotic island handling 2 different product codes, composed of infeed conveyor and case preparation, conveyor for stacks of empty pallets and conveyor for removing full pallets.

## Perseus<sub>zero</sub>

### "Plug & Play" Palletiser

Palletiser built up from pre-assembled and pre-tested modules, suited to low speeds, generally used in sectors such as food, petro-chemicals and detergents where particularly high speeds are not required.

Speed: up to 2.5 layers per minute.



Simplified side elevation diagram of Perseus with integrated pusher which saves space in the release area.



## Productivity and reduction of production costs



Over the last years, we have witnessed a considerable increase of electronic components in the manufacture of automated systems and machines across all industrial sectors; this trend has also played a leading role in the packaging industry, thereby influencing the development of information technology in the field of industrial production.

The benefits have proven significant in terms of productivity and efficiency during production: reduced costs for planned and corrective maintenance, greater flexibility and faster format changes, monitoring of production data to permit targeted actions to improve performance levels. All these benefits have quickly turned electronic machines into an explicit customer need.

For some time now, Ocme has been implementing avant-garde technologies into its range of machines, guaranteeing high efficiency levels without compromising flexibility. Machines such as Perseus, Orion and Pegasus allow for such fast servicing operations that a very high level of availability (meaning time available for production) is guaranteed even in case of breakdown; guided tools for the creation of new palletising patterns and assisted format change procedures have rendered production rates less sensitive to the proliferation of products and types of packages.

Ocme machines are equipped with a user-friendly operator interface that has also helped fulfil the growing need for shorter training times even for less experienced operators.

Ocme's decision to use components keyed to maximum compatibility with the most widespread communication protocols is by no means negligible, as it permits monitoring production data for more efficient maintenance and management of spare parts, as well as allowing better management of OEE (Overall Equipment Effectiveness) systems.

Of no less importance is the webcam-controlled remote-assistance system, which has drastically reduced servicing costs and times thanks to its efficiency, as well as rendering supervision by highly qualified production personnel obsolete.

To date, the results reached by Ocme in terms of reducing costs and increasing production levels are the fruit of an essential and on-going collaboration with its customers, a type of partnering that has permitted, and will continue to permit, meeting customer needs, both explicit and latent, aimed at the continuing improvement of production costs and efficiency.



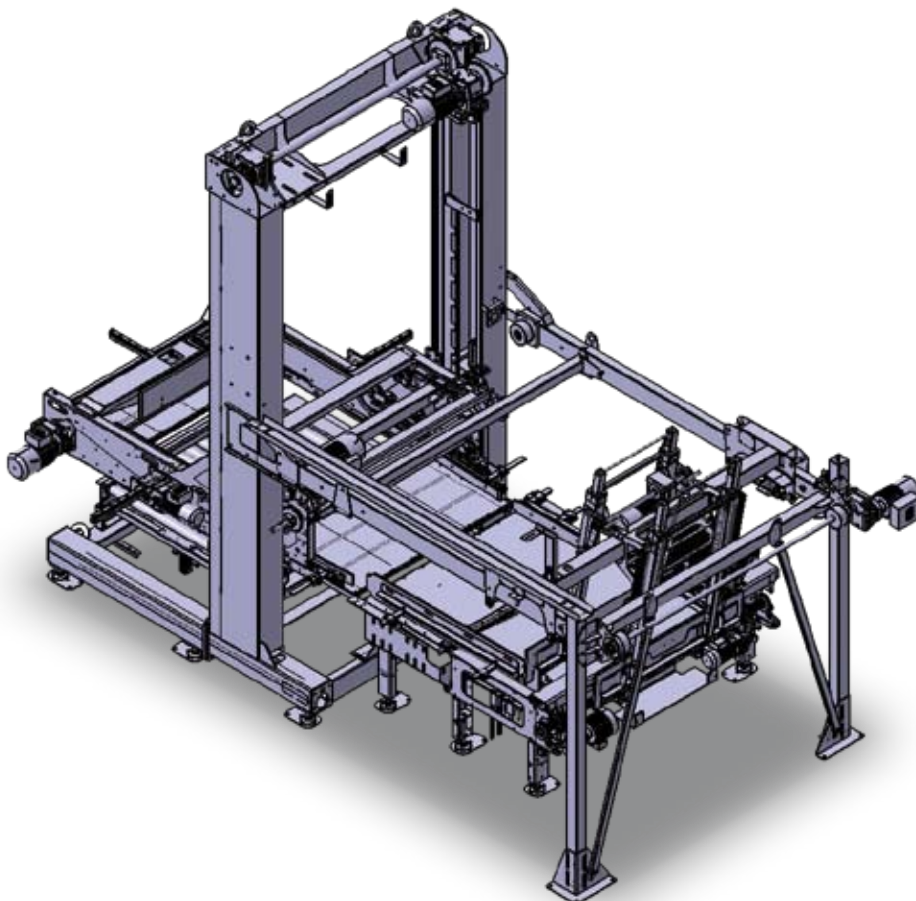
**Figure 23**

The simulation programme developed in collaboration with the faculty of engineering of the University of Parma, permits inputting production data to simulate a video of the layer preparation stages with manipulators.

## Safety and ergonomics

**i**n designing new palletising systems, it has proven indispensable to take into account factors such as ergonomics and safety: systems are equipped with the most advanced protection devices and, at the same time, ensure maximum accessibility to facilitate cleaning and maintenance. Moreover, specific technical solutions have also greatly reduced noise levels. Many machines, such as the Pegasus robot, also comprise advanced active safety devices. An anti-collision system is installed on the gripping heads, giving the robots increased space awareness and thus avoiding collisions with products or objects that may accidentally cross the robot's range of action. Ergonomics, which are closely tied to system availability

and productivity, has attracted the interest of software creators. The operator interfaces for the new Ocme palletisers and robots have been designed to be user-friendly and take into account parameters such as usability and ease of learning. Increasing the size of the touch-screen and the inclusion of the Albatros system on some machines supplies greater information and improves the quality of graphic interface. Another aspect that benefits operators is the drastic reduction of maintenance required by the machines. Thanks to the careful re-designing of a good deal of the machines and also thanks to the use of modular components, we are able to meet extremely high reliability and standardisation levels.







## Marketing levers



owadays, a good palletiser is also a corporate marketing tool. Seeing as pallets may now directly reach the supermarket floor, it is of tantamount importance for palletisers to be able to manage a variety of

alternatives such as to satisfy the constant need for differentiation that company's now have. Among the numerous applications of OCME palletising technologies, one that is certainly worthy of mention is the possibility of managing pallets that are not strictly speaking "conventional", such as, for example, "display pallets". These are platforms that measure approximately one

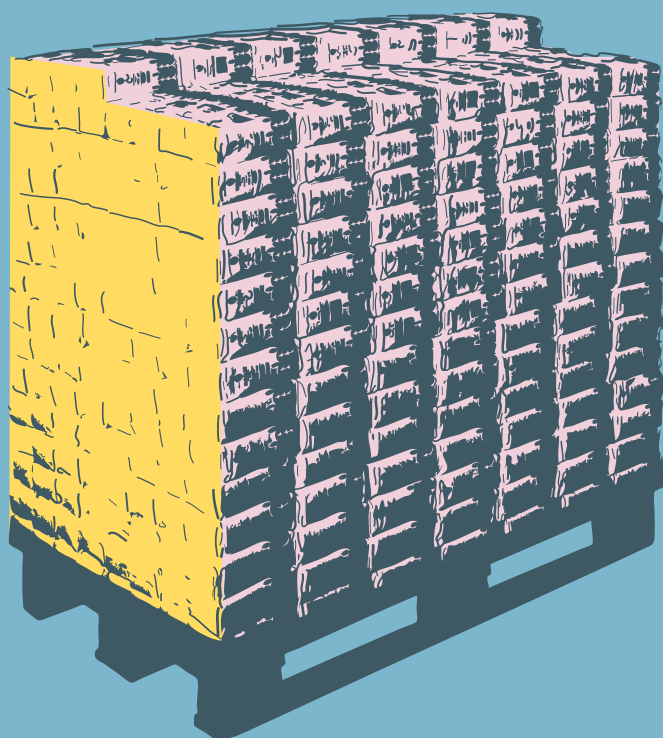
quarter of a normal pallet, fitted with wheels for operator handling at the point of sale without having to close the sales aisles. Furthermore, it has become increasingly



important to be able to control which direction products face on the pallet, that is, to be able to arrange primary or secondary packages so as to favour the visibility of product graphics and brands. OCME palletisers are equipped with various devices that permit managing tailored palletising patterns starting directly from product infeed and based on customer requirements. Manipulators and robots also guarantee an even more accurate degree of control, with all the added flexibility that results from their capacity to quickly adapt to any new task assigned.

The need for differentiation involves first and foremost the solidity of primary containers (bottles, boxes, etc.). Alongside this characteristic, the general tendency to reduce the weight of packaging materials also results in products that are increasingly less stable and therefore difficult to palletise. Consequently, a palletiser that can easily manage any type of package is not only an efficient logistics instrument, but also serves to overcome technical limitations tied to the development of new products, new packages and, consequently, new markets.





## OCME palletisers and respect for the environment



owadays, protecting and caring for the environment, for persons and for everything that surrounds us are

fundamental aspects of corporate choices.

Companies cannot afford to ignore issues such as environmental impact and industrial safety in the organisation of productive factors.

Hence, OCME has incorporated these philosophies into its new-generation palletising systems: the Orion, Perseus and Pegasus new palletising systems and the new generation of manipulators respond to the need to reduce primary and secondary packaging materials, which allows handling products that are increasingly fragile and unstable.

In designing new palletising systems, it has proven indispensable to take into account factors such as ergonomics and safety: systems are equipped with the most advanced

protection devices and, at the same time, ensure maximum accessibility to facilitate cleaning and maintenance. Moreover, specific technical solutions have also greatly reduced noise levels.

OCME has been committed for several years now to the OCME WorldCare project, a corporate plan aimed at education and proactive intervention in environmental protection issues, through the segregated collection of waste materials and a careful use of energy and raw materials in general. The principles of the project focus on raising the awareness of design engineers to issues such as environmental protection and dwindling resources.

The aim is to design new series of systems whose performance will evolve hand in hand with the capacity to guarantee ecologically sustainable development.



# WorldCare

Corporate environmental respect programme



All the OCME technologies dedicated  
to your sector

One of the characteristics for which OCME is renown for in the market is the company's flexible approach to customer needs. We believe that each sector must be followed with specific care, because each has specific needs. For this reason, our staff of professionals is specialised in responding to the needs of every single customer, based on the unique characteristics of each sector.

Beer

Mineral water

Soft-drinks

Wines and spirits

Food

Edible oils

Tissue

Petrochemicals

Pharmaceuticals

Products for personal and home care

## OCME S.r.l.

Via del Popolo, 20/A  
43122 Parma (Italy)  
Phone +39-0521-275111  
Fax +39-0521-272924  
e-mail: info@ocme.it

## OCME UK Ltd.

King John House, Kingsclere Park  
Kingsclere - Newbury  
Berkshire RG20 4SW (UK)  
Phone: +44-1635-298171  
Fax : +44-1635-297936  
e-mail: sales@ocme.co.uk

## OCME AMERICA CORPORATION

5300 N.W. 33rd Avenue, Suite 105  
Ft. Lauderdale, FL 33309  
Phone: 954-318-7446  
Fax: 954-634-0238  
e-mail: info@ocmeusa.com

## OCME FRANCE

42 avenue Montaigne  
75008 Paris  
Phone: +33 (0) 6 27.89.36.20  
email: commercial@ocme.fr

## OCME Packaging Equipment (Jiaxing)

No.289 Mu Yang Road,  
Jiaxing Economic Development Zone,  
314033 Jiaxing City,  
Zhejiang Province, P.R.China  
Phone: +86-573-83971680  
Fax: +86-573-83971690  
E-mail: info@ocme.cn

## OCMEXICO Embalaje, S. de R.L. de C.V.

Homero 425 Desp. 2 Torre "B"  
Col. Chapultepec Morales  
México D.F. CP 11570  
Phone: +52-55-52542401 ext. 103  
Fax: +52-55-52542401 ext. 106  
e-mail: info@ocme.com.mx

## OCME and end of line machines

Our mission, as suppliers of packaging technologies, is not only the installation of systems that provide solutions to immediate problems. Rather, we believe that our role is to provide a vision of the **future of end of line machines** and create avant-garde solutions. At any rate, this is what we have been doing since 1954.

This document presents our experience and our vision of palletising technologies based on the Orion and Perseus systems and on the innovative Pegasus robot palletisers. Like all OCME products, all the models of the palletising series are designed for intense work loads and to guaranty the performance rates requested by customers.

Nowadays, companies in every sector of the manufacturing industry have a new opportunity to differentiate themselves and increase competitiveness: end of line automation and optimisation of storage sites.

