



AUTOMATIC PALLETIZING SYSTEMS

4.0 INDUSTRY
compliant



Automatic palletizing systems

» SMI palletizing systems set a new standard in the scenario of robotized palletizers equipped with two Cartesian axes.

SMI's APS series is the result of intense research and innovation, which has allowed us to implement technologically advanced systems that now offer each user the packaging solution best suited to his/her needs.

SMI palletizing systems are able to optimize the end-of-line operations of many industrial sectors: beverage production, agricultural and food, chemicals, pharmaceuticals, detergents, glass, paper and many others.

The APS series consists of automatic systems that palletize cardboard blanks, packets, trays, and packs in general.

By integrating the system main functions into the central column, SMI's palletizing systems are extremely compact and easily adaptable to any logistic condition of the end-of-line area, both in existing systems and in new installations.





SMI palletizing systems are able to optimize the end-of-line operations of many industrial sectors: beverage production, agricultural and food, chemicals, pharmaceuticals, detergents, glass, paper and many others.

» **Fast and accurate operations**

APS series palletizers are equipped with independent machine axes driven by electronically-controlled brushless motors, which ensure fast, smooth and accurate movements.

The use of this solution in the field of palletizing systems, characterized by repetitive actions, enables to achieve high reliability and reduce maintenance and running costs.

» **Innovative technology and ease of use**

Both machine automation and control rely on innovative technology based on Sercos fieldbus, through which the operator can quickly and easily manage all palletizing operations at the end of the line using a simple and user-friendly man-machine interface.

System management is made even easier by the use of advanced graphics, touch screens and a wide range of diagnostics and technical support available in real time.

The system's high degree of automation features low energy costs as well as low running and maintenance costs.

» **Guaranteed strength and reliability**

The accurate sizing of both the column and the horizontal beam, combined with their sliding on recirculating ball runners, ensure fluid and continuous movements with minimal dynamic buckling and virtually no vibrations: this ensures a long lifecycle of the mechanical components.



» **Maximum safety at all times**

The range of SMI's APS series palletizers is equipped with a brand new dedicated "Safety PLC", which allows you to program the safety systems in a flexible, reliable and efficient manner.



The PLC monitors the proper operation of all the machine's safety devices, integrating them together. It also allows the user to create custom protection areas within the perimeter of the palletizing system.

This significantly reduces machine downtime both in case of emergencies and during the loading operations of pallets, interlayer pads, etc., thanks to differentiated logics for the various areas of intervention.

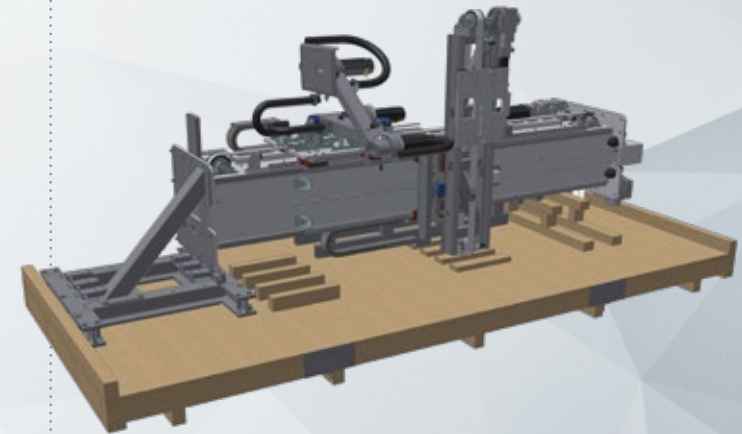
As such, maintenance is easier and any adjustment to future safety standards will be faster and safer as they will be upgraded directly via the PLC's program.

» **Energy savings and reduced maintenance**

SMI's APS palletizing systems easily fit into existing or newly installed packaging lines and are immediately operational. By integrating multiple functions into just a few operating units, these systems are assembled, pre-wired and tested at the factory before delivery, hence minimizing assembly and start-up at the customer's facility. The system's high degree of automation, its mechanical simplicity, the use of robot-based components and its structural optimization allow a significant cut in maintenance costs and reduction in energy consumption, as well as the extension of the system's life cycle.

» **Low transportation costs**

The single-column module fits easily inside a standard 20' container, which reduces transportation and storage costs and simplifies shipping paperwork. Each module is assembled, pre-wired and tested before delivery, which simplifies and quickens assembly and start-up at the customer's facility.



	FEATURES	SPEED*
APS I540	LAYER FORMATION WITH 90°PRODUCT INFEED	40 PPM 120 LPH
APS I550 P	3-IN-1 FUNCTIONAL UNIT SCARA TECHNOLOGY	50 PPM 200 LPH
APS 3090 P	3-IN-1 FUNCTIONAL UNIT SCARA TECHNOLOGY	90 PPM 300 LPH
APS 3070 L APS 3105 L APS 3140 L	MANIPULATOR-EQUIPPED IN-LINE LAYER PRE-COMPOSITION/S	70 PPM / 200 LPH 105 PPM / 300 LPH 140 PPM / 300 LPH

* Maximum speed referred to columnar pattern 21 (no pack rotation).
3x2 packs, 1.5 L bottles (PPM: packs per minute - LPH: layers per hour).



UP TO 40 PPM*



» Fixed column with loading head

The APS 1540 is made up of a single-column palletizing system with two Cartesian axes, with bottom-up movements.

The vertical axis consists of a fixed column on which the horizontal beam slides on recirculating ball guides; the loading head slides horizontally on said beam, always on recirculating ball guides.

The beam's vertical movements and the horizontal ones of the head-holder are driven by brushless motors, which ensure perfect trajectories during all palletizing phases.

» Main features

- Compact layout: the central column is equipped with a loading head (basket) moving along two Cartesian axes
- Layer formation with 90° product infeed
- Pre-assembled modules for easy and fast assembly and start-up
- Smooth movements of the horizontal beam on recirculating ball skids
- Independent machine axes controlled by brushless motors for fast and precise movements
- Independent pallet magazine for pallet feeding
- Independent layer-inserting device for layer feeding (optional)

- Maximum output rate of 40 packs per minute (120 layers / hour), referred to columnar pattern 21 (no pack rotation), 3 x 2 packs, 1.5 L bottles
- Pallets handled: europallet 800x1200 mm and 1000x1200 mm (other formats upon request)
- Layer formation by loading head (basket), which eliminates pattern workability limits
- Pack rotation (accessory on sale) occurs by pneumatic contrast
- The interlayer pad-inserting device is an accessory on sale; the new version enables to load directly the whole pallet of pads (the pallet has to comply with specific tolerances)

*Max speed referred to columnar pattern 21 (no pack rotation), 3 x 2 packs, 1.5 L bottles. (PPM: packs per minute - LPH: layers per hour)

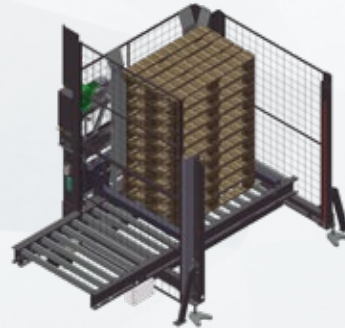
Standard configuration

» Row transfer device



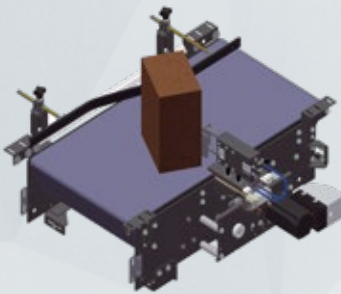
The row transfer process is managed by a motorized bar. After a row is formed, it gets pushed straight away into the loading head (basket). The system is equipped with a "dead" plate (buffer), which enables to continue with the row push-in operations even when the head is not yet in the loading position.

» Empty pallet magazine



- **Standard:** 1 pile of empty pallets
Maximum height: 1800 mm
Pile maximum weight: 300 kg
- **Optional:** stackable pallet magazine, suitable for very heavy pallets (up to 700 kg)

» Pack rotation devices



This optional system allows to turn packs being fed to the palletizer by means of a contrast cylinder. If packs get to the machine with the short side leading, a second optional cylinder is available to ease the rotation process.

» Layer-inserting device (optional accessory)



Independent device to feed layers featuring a portal frame. Possibility to directly load the whole layer pallet, provided that it respects alignment limits set for the machine. Side guides to contain layers are available as an optional accessory.

» Column lifting



Central column lifting by crane only.

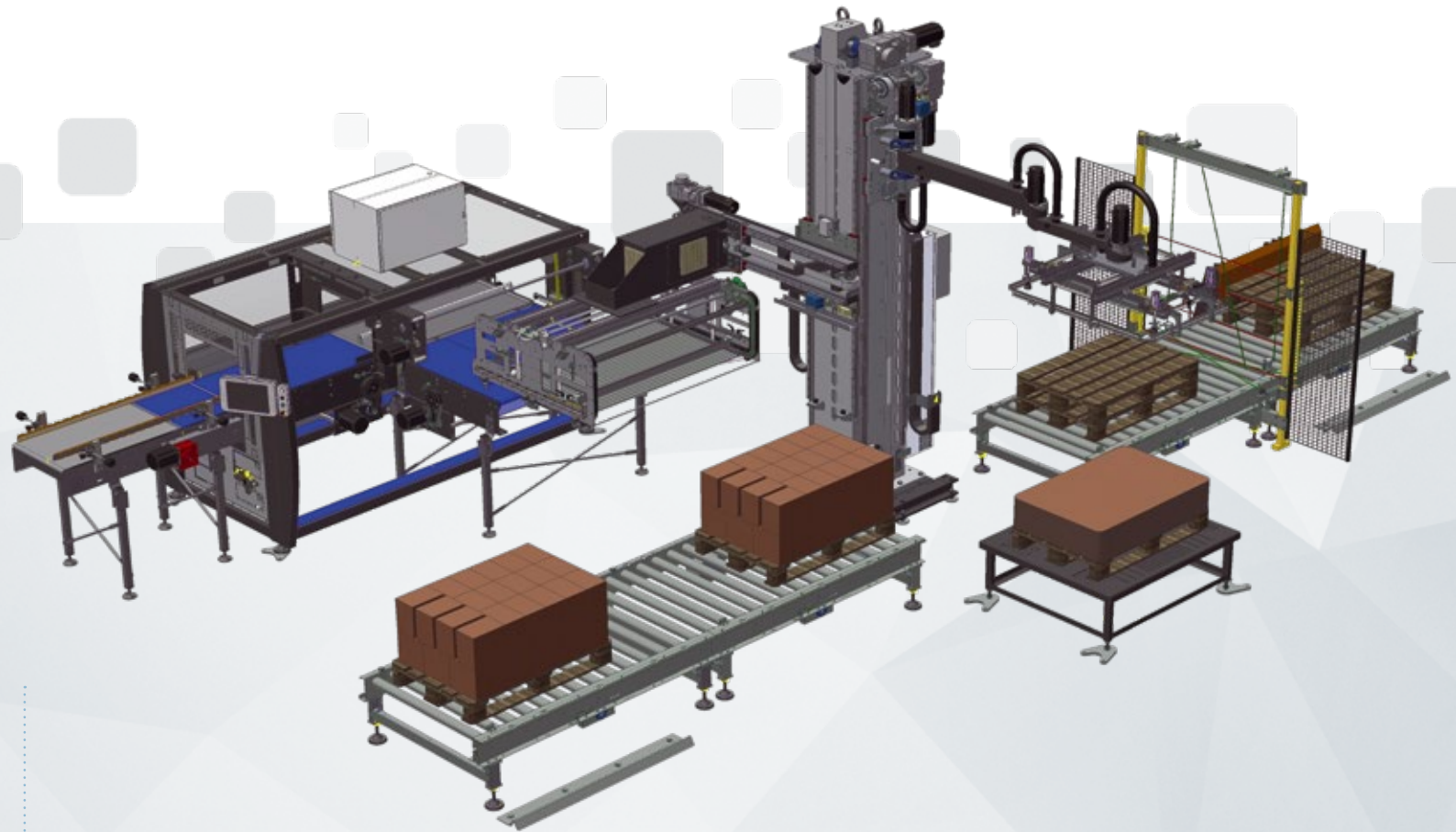




UP TO 50 PPM*

» "3-in-1" fixed column equipped with SCARA technology loading head and arm

This system combines the palletizing operations, the feeding of the empty pallets and the insertion of the interlayer pads inside the structure of the "3-in-1" central column: i.e. three processes usually carried out by separate machines within their own dedicated spaces. The integration of these three functions inside the central column is made possible by a series of technical innovations devised by SMI design engineers. Specifically, the horizontal beam on which the layer loading head slides is equipped with a telescopic guide system that allows the beam to move faster on its own transverse axis. In this way, the



side of the column that remains clear when the packs are inserted into the loading head is exploited by the system for housing the mechanical assembly fitted with SCARA technology, which manages pallet flow and interlayer pad insertion. This assembly essentially consists of an articulated horizontal arm that mounts, at its far end, both a gripper to pick up the pallets and a suction cup-grasping unit to move the cardboard interlayer pads. The arm slides up and down in the central column in order to pick up and release the pallets and interlayer pads, and then it slides horizontally to transfer the pallets and interlayers from their magazines to the palletizing pallet.

» High operational reliability and compact size

The operations of the SCARA arm are handled by the machine's automation and control system in perfect synch with the operations performed by the layer-loading head, so that the vertical and horizontal movements of the various mechanical units moving on the central column can follow precise and coordinated trajectories that prevent any contact or interference between one another.

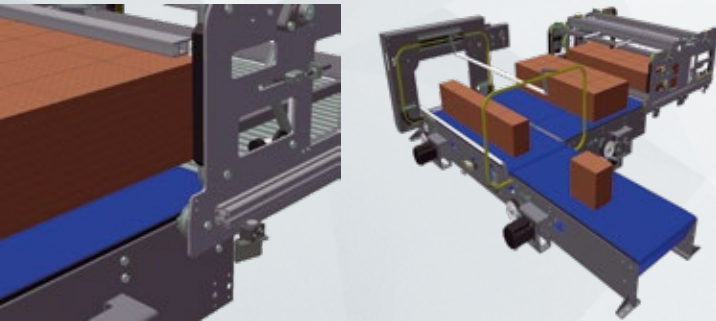
SMI's APS automatic palletizing system offers all the advantages of Cartesian axes technology but with reduced machine overall dimensions as compared to traditional solutions.

*Max speed referred to columnar pattern 21 (no pack rotation), 3 x 2 packs, 1.5 L bottles. (PPM: packs per minute - LPH: layers per hour)

Standard configuration

» Grouping of packs and row/layer pre-composition

The infeed section is equipped with a layer pre-composition system consisting of mat belt system. As an accessory you can add a pack-turning device based upon a "pack-hindering" system or, alternatively, a newly designed gripper-equipped manipulator; this latter device gets the packs in transit rotated when requested by the palletization pattern, without being affected by the mishaps related to "pack-hindering" type pack-turning units. Through these systems, the packs are rotated before the row is formed.

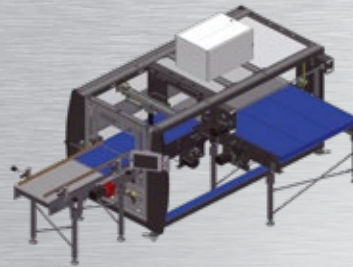


» Composing the layer on the pallet

This stage of the palletizing process composes a row of packs which is later moved, by means of a loose bar, onto a layer-composing "parking" belt, awaiting the subsequent rows. From here, a conveyor belt smoothly introduces the complete layer into the loading head, the so-called "basket", which finally transfers it to the pallet being formed. This configuration allows the arranging of almost 4 layers in sequence and within a very limited space (one partially formed, one "parked", one on the loading head and the last one on the pallet), thus ensuring greater system efficiency.

All the modules featuring the APS palletizing systems are designed according to FCR (Full Cost Reduction) methodologies and supplied to the customer fully assembled and wired.

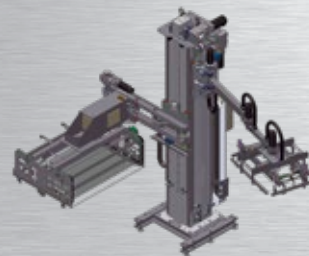
» Single infeed



This single-infeed layer composition system comes with a rubberized cadencing belt, a product-insertion belt aimed at forming the row, and a one-way translation system that contributes to the formation of the layer.

The layer is transferred from the belt to the basket smoothly and precisely as it exploits the belt's movement, and does not require the use of any mechanical layer translation components.

» "3-in-1" fixed column equipped with SCARA technology loading head and arm



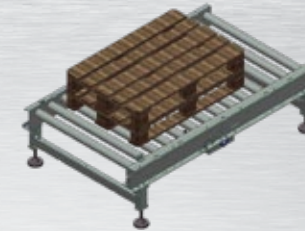
The "3-in-1" fixed column houses the mechanical parts designed to carry out the palletizing operations, feed the empty pallets and insert the interlayer pads, i.e. three processes usually carried out by separate

machines within their own dedicated spaces.

The horizontal beam on which the layer loading head slides is equipped with a telescopic guide system that allows the beam to move faster on its own transverse axis while the SCARA articulated

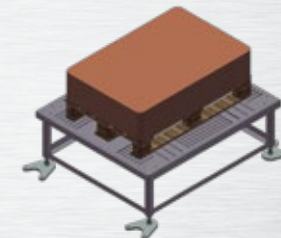
arm integrates the functions related to the feeding of the empty pallets and the insertion of the interlayer pads.

» Empty pallets feeding system



The APS palletizer is equipped with a system that feeds the empty pallets, and is made up of roller or chain conveyors (depending on the pallet's loading and releasing direction). Storage capacity: about 10 pallets up to a maximum height of 1700 mm.

» Interlayer pad feeding system



Pad feeding system adjusted according to different interlayer pad sizes. This controlled-axes pad-inserting unit (depending on the chosen palletizing system) is built into the central column of

the APS palletizer. Suction cup-grasping system with 4 to 8 adjustable points, to ensure the proper lifting of any type of interlayer pad.

» Pallet roller conveyor

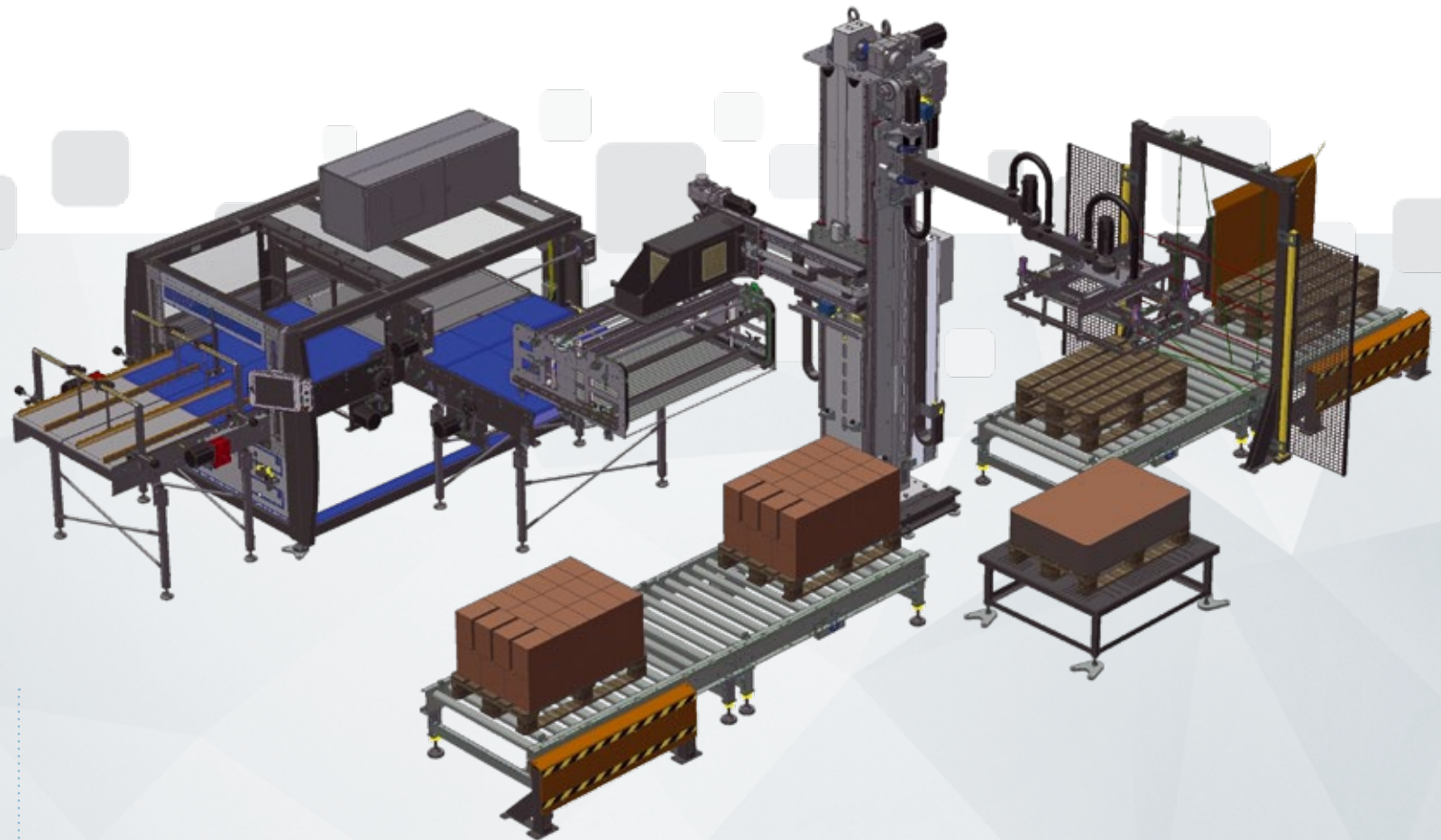
This is a galvanized steel structure with \varnothing 76-mm rollers and 150-mm pitch, motor driven by a 5/8" chain. Electronically reversible central motorization. Available in different lengths: 1500 mm, 2000 mm, 2500 mm and 3000 mm.



UP TO 90 PPM*

» "3-in-1" fixed column equipped with SCARA technology loading head and arm

This system combines the palletizing operations, the feeding of the empty pallets and the insertion of the interlayer pads inside the structure of the "3-in-1" central column: i.e. three processes usually carried out by separate machines within their own dedicated spaces. The integration of these three functions inside the central column is made possible by a series of technical innovations devised by SMI design engineers. Specifically, the horizontal beam on which the layer loading head slides is equipped with a telescopic guide system that allows the beam to move faster on its own transverse axis. In this way, the



side of the column that remains clear when the packs are inserted into the loading head is exploited by the system for housing the mechanical assembly fitted with SCARA technology, which manages pallet flow and interlayer pad insertion.

This assembly essentially consists of an articulated horizontal arm that mounts, at its far end, both a gripper to pick up the pallets and a suction cup-grasping unit to move the cardboard interlayer pads. The arm slides up and down in the central column in order to pick up and release the pallets and interlayer pads, and then it slides horizontally to transfer the pallets and interlayers from their magazines to the palletizing pallet.

» High operational reliability and compact size

The operations of the SCARA arm are handled by the machine's automation and control system in perfect synch with the operations performed by the layer-loading head, so that the vertical and horizontal movements of the various mechanical units moving on the central column can follow precise and coordinated trajectories that prevent any contact or interference between one another.

SMI's APS automatic palletizing system offers all the advantages of Cartesian axes technology but with reduced machine overall dimensions as compared to traditional solutions.

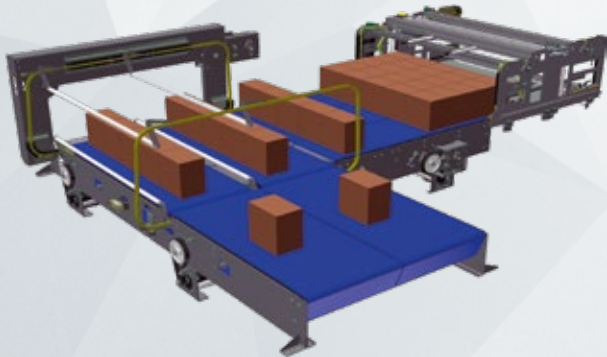
*Max speed referred to columnar pattern 21 (no pack rotation), 3 x 2 packs, 1.5 L bottles. (PPM: packs per minute - LPH: layers per hour)

Standard configuration

» Grouping of packs and row/layer pre-composition

The infeed section is equipped with a layer pre-composition system consisting of mat belt system. As an accessory you can add a pack-turning device based upon a "pack-hindering" system or, alternatively, a newly designed gripper-equipped manipulator; this latter device gets the packs in transit rotated when requested by the palletization pattern, without being affected by the mishaps related to "pack-hindering" type pack-turning units.

Through these systems, the packs are rotated before the row is formed.



» Composing the layer on the pallet

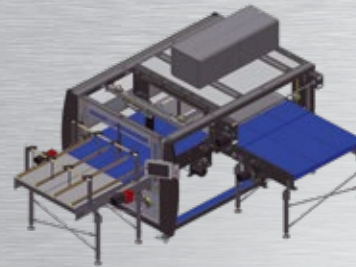
This stage of the palletizing process composes a row of packs which is later moved, by means of a loose bar, onto a layer-composing "parking" belt, awaiting the subsequent rows.

From here, a conveyor belt smoothly introduces the complete layer into the loading head, the so-called "basket", which finally transfers it to the pallet being formed.

This configuration allows the arranging of almost 4 layers in sequence and within a very limited space (one partially formed, one "parked", one on the loading head and the last one on the pallet), thus ensuring greater system efficiency.

All the modules featuring the APS palletizing systems are designed according to FCR (Full Cost Reduction) methodologies and supplied to the customer fully assembled and wired.

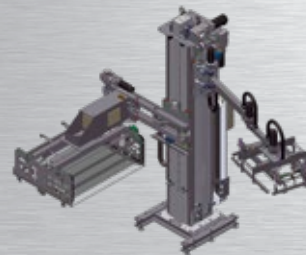
» Double infeed



This double-infeed layer composition system comes with two rubberized cadencing belts, two product-insertion belts aimed at forming the row and a one-way translation system that contributes to the formation of the

layer. The layer is transferred from the belt to the basket smoothly and precisely as it exploits the belt's movement, and does not require the use of any mechanical layer translation components.

» "3-in-1" fixed column equipped with SCARA technology loading head and arm



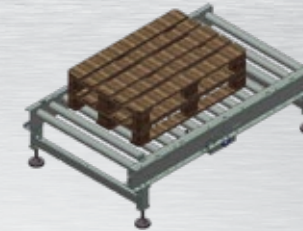
The "3-in-1" fixed column houses the mechanical parts designed to carry out the palletizing operations, feed the empty pallets and insert the interlayer pads, i.e. three processes usually carried out by separate

machines within their own dedicated spaces.

The horizontal beam on which the layer loading head slides is equipped with a telescopic guide system that allows the beam to move faster on its own transverse axis while the SCARA articulated

arm integrates the functions related to the feeding of the empty pallets and the insertion of the interlayer pads.

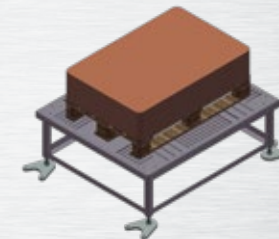
» Empty pallets feeding system



The APS palletizer is equipped with a system that feeds the empty pallets, and is made up of roller or chain conveyors (depending on the pallet's loading and releasing direction).

Storage capacity: about 10 pallets up to maximum height of 1700 mm.

» Interlayer pad feeding system



Pad feeding system adjusted according to different interlayer pad sizes.

This controlled-axes pad-inserting unit (depending on the chosen palletizing system) is built into the central column of

the APS palletizer. Suction cup-grasping system with 4 to 8 adjustable points, to ensure the proper lifting of any type of interlayer pad.

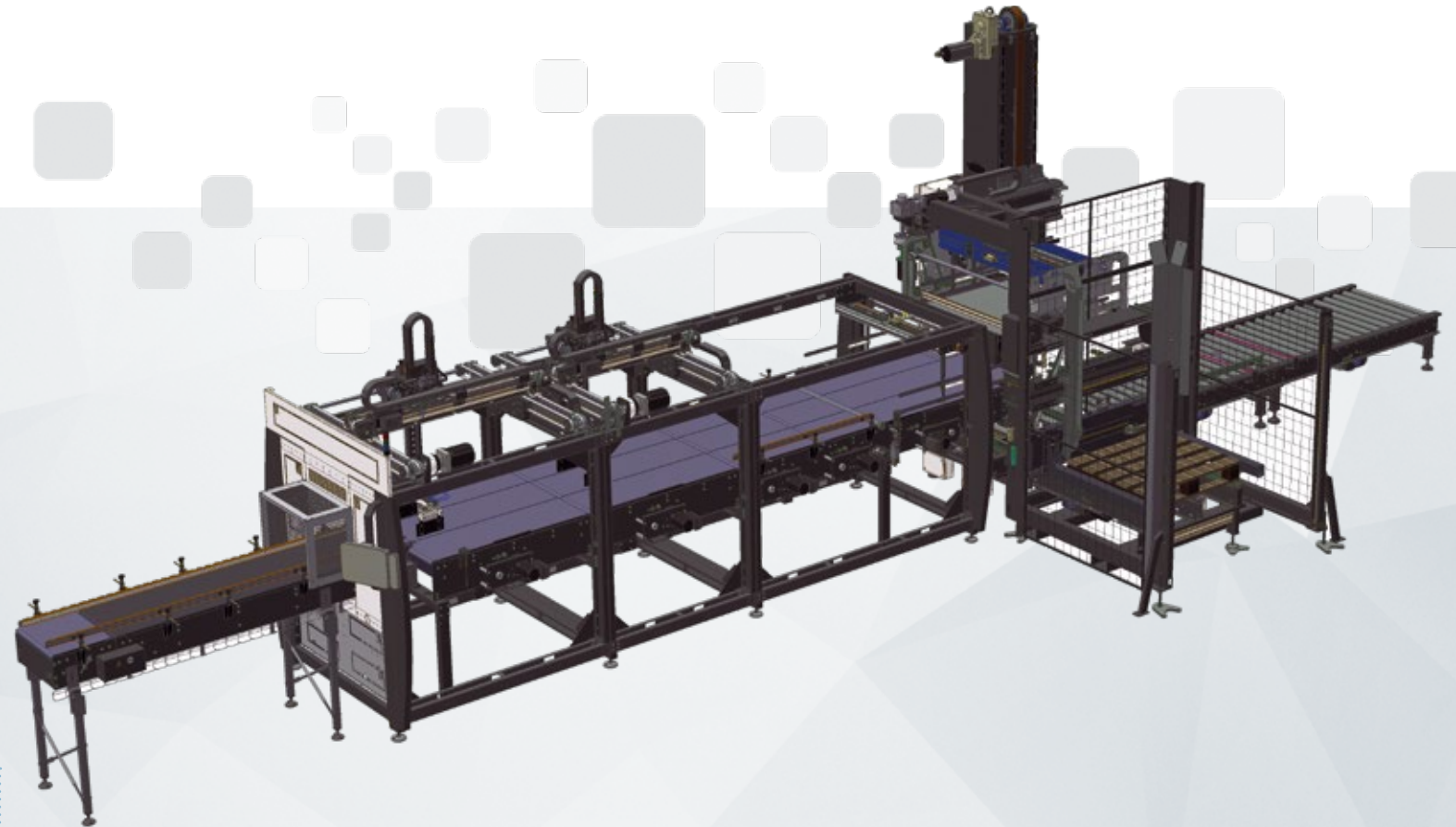
» Pallet roller conveyor

This is a galvanized steel structure with \varnothing 76-mm rollers and 150-mm pitch, motor driven by a 5/8" chain.

Electronically reversible central motorization. Available in different lengths: 1500 mm, 2000 mm, 2500 mm and 3000 mm.



UP TO 70 / 105 / 140 PPM*



» **Fixed column with loading head**

The APS 3070L / 3105L / 3140L is made up of a single-column palletizing system with two Cartesian axes, with bottom-up movements.

The vertical axis consists of a fixed column on which the horizontal beam slides on recirculating ball guides; the loading head slides horizontally on said beam, always on recirculating ball guides.

The beam's vertical movements and the horizontal ones of the head-holder are driven by brushless motors, which ensure perfect trajectories during all palletizing phases.

» **Main features**

- Compact layout: the central column is equipped with a loading head (basket) moving along two Cartesian axes
- Continuous layer-forming system with one (APS 3070L), two (APS 3105L) or three (APS 3140L) manipulators
- Pre-assembled modules for easy and fast assembly and start-up
- Smooth movements of the horizontal beam on recirculating ball skids
- Independent machine axes controlled by brushless motors for fast and precise movements
- Independent pallet magazine for pallet feeding
- Independent interlayer pad-inserting device for interlayer pad feeding (optional)
- Pallets handled: 800x1200 mm and 1000x1200 mm Euro pallets (other formats upon request)
- The interlayer pad-inserting device is an accessory on sale; the new version allows to load directly the whole pallet of interlayer pads (the pallet has to comply with specific tolerances)

*Max speed referred to columnar pattern 21 (no pack rotation), 3 x 2 packs, 1.5 L bottles. (PPM: packs per minute - LPH: layers per hour)

Standard configuration

» Layer pre-forming infeed



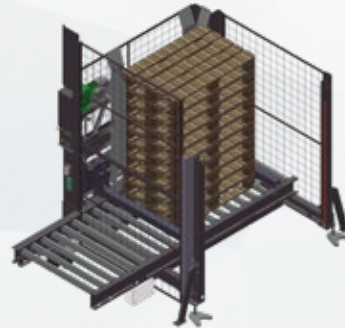
By means of an innovative system of pack rotation and/or manipulation, bundles coming along a belt in single/double line are turned, shifted and arranged onto multiple lanes according to the palletization pattern. The infeed is very compact and allows to streamline the end-of-

line space management. The layer-forming system is equipped with sliding safety guards featuring a rounded shape which let all the motors be placed externally if compared to the mechanical groups they activate.

	MANIPULATORS	SPEED*
APS 3070 L	1	70 PPM 200 LPH
APS 3105 L	2	105 PPM 300 LPH
APS 3140 L	3	140 PPM 300 LPH

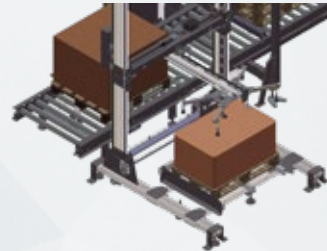
* Maximum speed referred to columnar pattern 21 (no pack rotation).
3x2 packs, 1.5 L bottles (PPM: packs per minute - LPH: layers per hour).

» Empty pallet magazine



- **Standard:** 1 pile of empty pallets
Maximum height: 1800 mm
Pile maximum weight: 300 kg
- **Optional:** stackable pallet magazine, suitable for very heavy pallets (up to 700 kg)

» Interlayer pad-inserting device (optional)



Independent interlayer pad-inserting device featuring a portal frame. Possibility to directly load the pallet of interlayer pads, provided that it respects alignment limits set for the machine. Side guides to contain interlayer pads are available

as an optional accessory. Interlayer pad automatic loading (optional): allows to load the pallet of interlayer pads without stopping the machine (through the addition of one station for loading pallets of interlayer pads and one station for unloading empty pallets).

» Column lifting



Central column lifting by crane only.



Accessory devices

» Pallet chain conveyor



- Galvanized steel structure for pallet handling by means of chains, 3/4" pitch, for optimal transfer in the non-rolling direction.
- Electronically reversible central motorization.

- Available in three different lengths: 1500 mm, 2000 mm and 3000 mm.

The system is delivered to the customer fully assembled and wired. This accessory is controlled by the electrical panel of the central module of the APS palletizing system.

» Translating pallets on rollers/chains at 90°



- Galvanized steel structure.
- Mixed system of rollers and chains for the orthogonal deviation of the pallets with reversal of the advancing front.

- Electronically reversible central motorization.

The system is tested at Smipal and delivered to the customer fully assembled and wired. This accessory is controlled by the electrical panel of the central module of the APS palletizing system.

» Pallet rotation



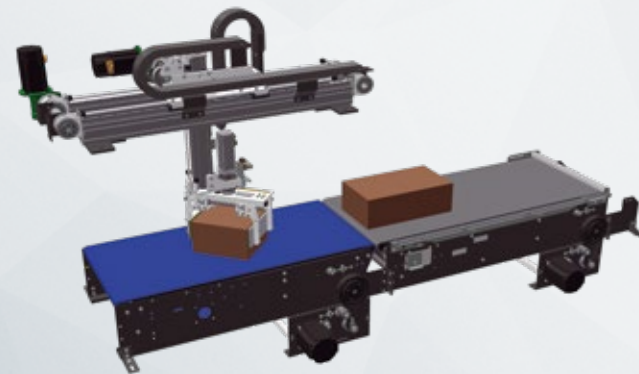
- Galvanized steel structure.
- Roller- or chain-fitted system for the rotation of the pallets while maintaining the advancing front.
- Electronically reversible central motorization.

The system is delivered to the customer fully assembled and wired.

This accessory is controlled by the electrical panel of the APS palletizing system's central module.

» Pack rotation by manipulator system (as a standard for APS 3070L / 3105L / 3140L)

This optional pack-rotating device is made up of an innovative newly-designed gripper that gets the pack in transit rotated and sets it in the required position. This option allows to reduce mishaps related to "pack-hindering" type pack-turning units.



» Magnetic head

Device for the replacement of the standard basket in case the palletizing operations require it and only for palletizing products whose upper part is made of iron (for example tinplate cans and glass jars with iron cap).

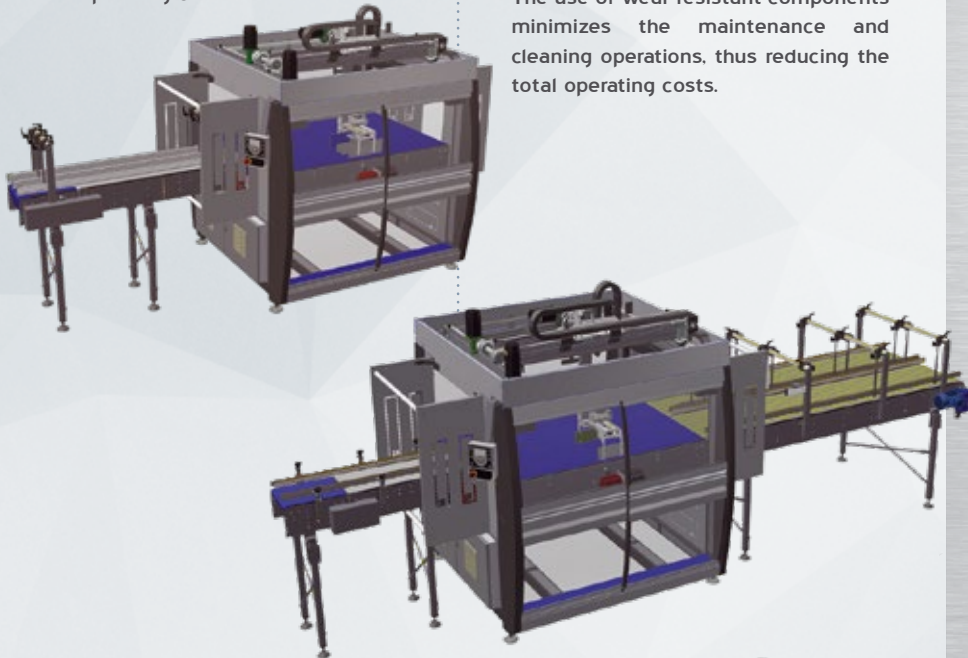
The magnetic head can also be equipped with another accessory enabling its rotation.





Packposer

The Packposer divider-laner receives the packs coming from the packer positioned upstream and, by means of an innovative manipulation system based on three Cartesian axes (x, y and z) and equipped with a motorized gripper, turns them and/or arranges them on two or more lanes, thus composing the format of repackaging set by the packaging machine's work program positioned downstream. The divider is made of top-quality materials, ensuring operational reliability and long-term duration. The use of wear-resistant components minimizes the maintenance and cleaning operations, thus reducing the total operating costs.



Packsorter

The Packsorter divider-laner receives the packs in single lane coming from the packer positioned upstream and, by means of an innovative manipulation system based on three Cartesian axes (x, y and z), arranges them on two or more lanes and conveys them toward the automatic palletization system positioned downstream.

The divider can receive also packs in double lane, thus working simply as a conveyor toward the palletizer.

The divider is made of top-quality materials, ensuring operational reliability and long-term duration.

The use of wear-resistant components minimizes the maintenance and cleaning operations, thus reducing the total operating costs.

Automation

SMI only manufactures advanced technology palletizers, featuring modular design, operating flexibility and high-energy efficiency, thanks to fully automatic processes, electronically controlled drive shafts and field bus wiring.



The hardware and software components are "open" and modular, in compliance with the most important international certifications and rely upon consolidated standards of the industrial field and of the packaging sector: OMAC guidelines (Open Modular Architecture Controls), sercos, PROFIBUS, IEC61131, OPC, Industrial PC.

In particular, by following the OMAC guidelines and the Omac Packaging Workgroup (OPW), SMI can guarantee easy integration with the other machines in line, user-friendly technology and maintenance of the investment value.

Moreover, SMI systems are compliant with the technical requirements of Industry 4.0 and IoT (Internet of Things) technologies, which allow to easily and effectively run production lines within a "Smart Factory", even remotely through mobile devices.



The automation and control system of SMI machines, called MotorNet System®, includes the following hardware components: MARTS (process controller), POSYC (man-machine interface), COSMOS (digital servodriver for brushless motors), dGATE and aGATE (remote IP65 I/O digital/analogic modules).

The MARTS is a PAC (Programmable Automation Controller), based on an industrial PC, which can be programmed in IEC61131 languages. The COSMOS servodrivers and the dGATE/aGATE I/O modules are connected to the PAC via sercos.

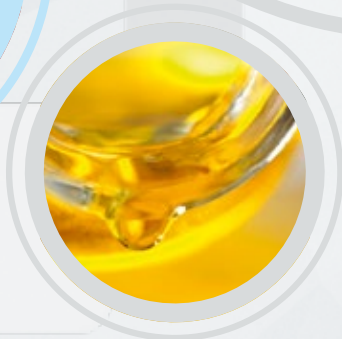
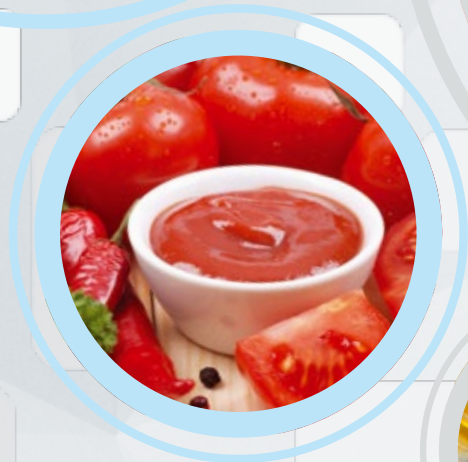
The POSYC is a HMI terminal, (touch screen IP65), based on an industrial PC with solid state drives.



MotorNet System®







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