

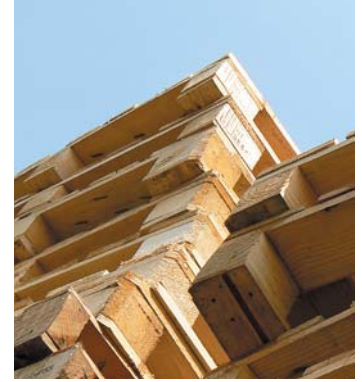
MultiPack



**The modular software system
for logistics and
packaging development**



Multiscience
GmbH



Modular software for logistics and packaging development

Multiscience GmbH has been founded in 1986. It exclusively works on the development of innovative software systems for the optimization of stowage space usage and for the controlling of automated palletizing stations. In this, Multiscience's activities do not focus on mathematics only. As the company name implies, we aim for a symbiotic relationship of mathematical theory and logistic or

packaging practice by means of interdisciplinary teamwork.

Multiscience offers the software systems MultiPack for packages of the same size and MultiMix for the optimization of stowage with heterogeneous packages.



MultiPack

Palletizing with packages of the same size



A separate brochure informs you on the scope of services by MultiMix

MultiMix

Optimized stowage of pallets and lorries with mixed packages

MultiPack was developed in cooperation with a leading food manufacturer and was first introduced to the public on the InterPack 1987 trade fair. In regard to solution quality, computing speed and graphic display, it was clearly superior to the palletizing programs available then. After over 20 years of continuous development MultiPack is used by over 1,500 companies worldwide in logistics and packaging development and as 'MultiPack for robots' for palletizing automation.

By the optimized utilization of the carrier capacity MultiPack forms the basis for efficient logistics as

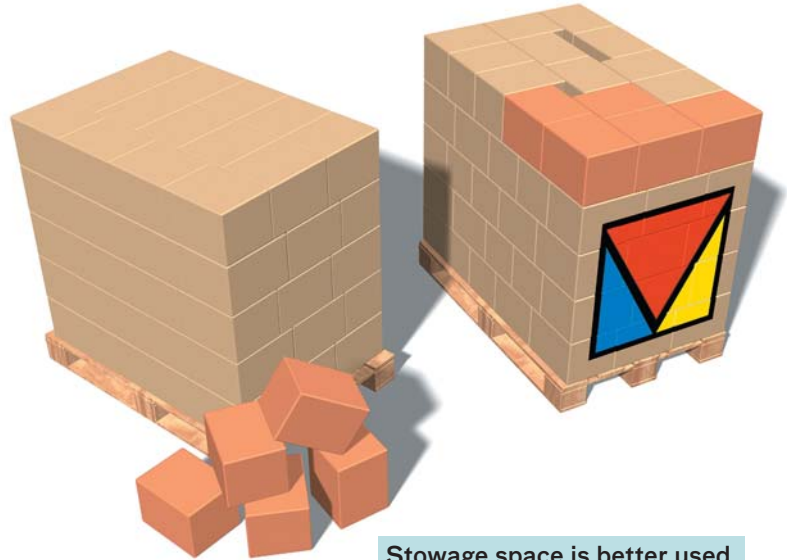
only by means of the maximum utilization of the stowage capacity of pallets, cases and containers the logistics costs can be minimized. In the development of new packages MultiPack also ensures the optimal adjustment of the package formats and loading patterns to the respective carriers.

The single modules of MultiPack can be combined and completed with specific extra functions according to the demands of the respective users in almost any way they like.

Loading optimization through the use of software

Without the help of an intelligent software system expensive stowage space is often wasted: For a carton with the dimensions 275 x 215 x 200 mm a loading plan for the Euro pallet can be quickly made by practical packaging experiments which seems to utilize the given stowage space well when the pallet is loaded solidly. According to this plan – which is typical for a conventional approach – 14 cartons per layer can be packed which corresponds to 70 cartons per pallet at a maximum height of 1,000 mm.

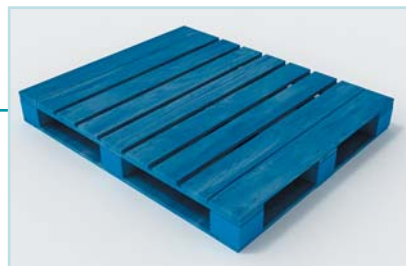
An optimum layer plan found with the help of MultiPack, on the other hand, makes 15 packages per layer possible and thus 75 cartons per pallet – so an increase of the stowage space utilization by 7.1% and thus a corresponding reduction of costs throughout the logistics chain is achieved.



Palletizing for rectangular packages

The pallet loading for rectangular packages is the basis module of the MultiPack system. By means of this function, a maximum utilization of the stowage space of pallets, containers and other load carriers can be realized.

You only enter length, width and height of the packages to be loaded and the stowage space available (including positive or negative overhang). MultiPack knows about all common pallet types. Additionally it is possible to define individual pallet sizes by an input form.



Optimum layer plans for
322 x 233 x 120 mm on a Euro pallet

MultiPack offers a list of alternative layer plans to the user. The computed layer plans can be modified interactively. By means of rotating or mirroring a layer plan or by means of the combination of different layer plans, solid interlocked stacks can be built. Here MultiPack will automatically suggest the respectively best interlocking.

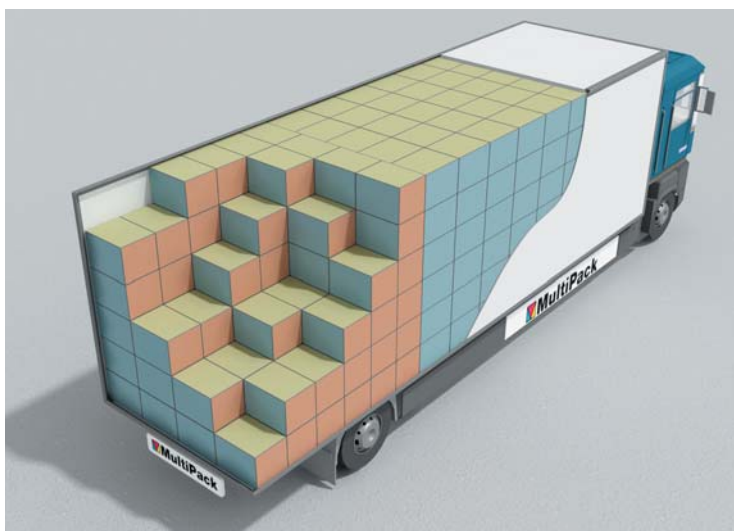
The pallet loadings generated by MultiPack can be viewed or printed out as layer top views, side views and three-dimensional views or saved in various file formats (e.g. for sending via e-mail). So it is possible to prepare and provide the printed material needed for the production.



Pallet with edge protection, safety tapes, pallet card and cardboard labels

Securing of the load and pallet cards

For the pallets loaded layer-wise, intermediate layers, resp. trays, can be inserted as needed. Further means of securing the pallets like covering pallets and covering boards, edge securing angles and safety tapes can be graphically represented. Pallet cards and cardboard labels can equally be defined and positioned interactively.



Loading onto lorries and into containers

Due to the pallet loading, lorries and containers can be filled optimally with packages of the same size. Additionally to the layer-wise loading, excess capacities on the side and in the door area can be used for upended packages if they have sufficient stability. For a defined amount of packages to be loaded a combination of different carriers at minimum costs can be defined, e.g. in the area of imports.



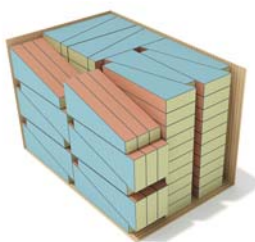
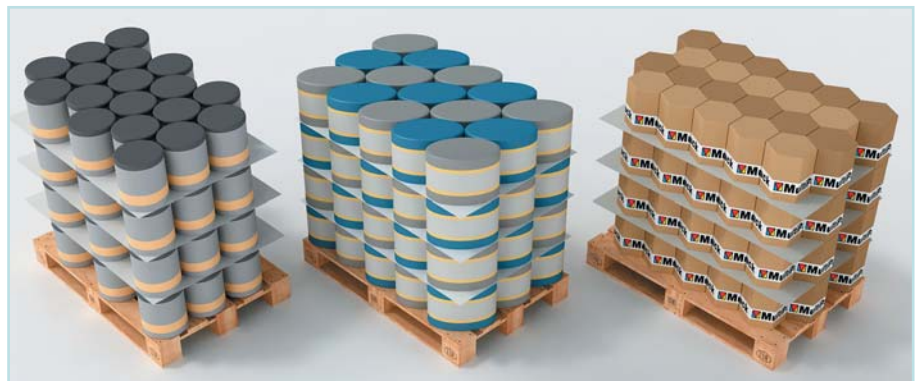
Non-layer-bound pallet loading

Especially with big packaging pieces, often a layer-wise pallet loading cannot reach sufficient stowage space utilization. In this case, MultiPack optionally generates non-layer-bound pallet loading and by this often allows a drastic improvement of the stowage space utilization. For a simplified realization of complex packaging patterns, the loading can be represented step by step.



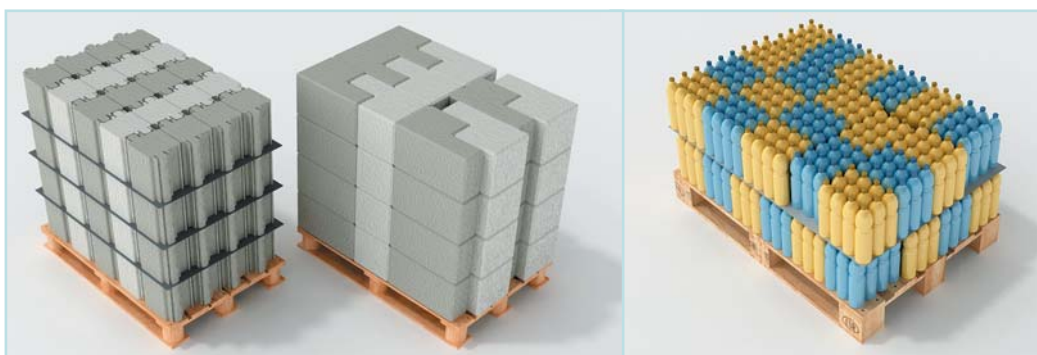
Pallet loading for round, oval and hexagonal packages ...

The pallet loading for round packages enables optimum stowage space utilization at the loading of cylindrical or conical packages like cans, bottles, buckets, rolls or barrels. Layer patterns with simple 60°- and 90°-arrangements of the packages as well as complex arrangements are available for the user to choose from. The same applies to oval and hexagonal packages.



... and for special forms

There are also special MultiPack modules available for bottle packs (e.g. shrink-wrapped PET bottles), L-shaped or wedge-shaped and complex packages. For this, the contours of complex shapes are imported from CAD files.



MultiPack generates a multitude of differently interlocked and offset palletizing patterns.

Optimized dimensional analysis of new packages



An efficient use of the transport capacity is not only achieved by optimized load planning but even more by a dimensional design of new packages best suited for logistics. In the scope of package design it is of great importance to ensure that the adjustment of the dimensions of single and outer packages to the carriers is optimized as far as possible.

Two-step analysis

For the packaging development, the two-step analysis in MultiPack is an indispensable tool: the sizes of single packages (for example folding cartons, cans, bags or bottles) and the outer package (for example cardboard boxes, trays...) are optimized for the pallet simultaneously. The primary goal is

the maximization of the number of single packages packed on a pallet.

According to the user's preconditions, the following values can be explored within seconds:

- arrangement of single packages in the outer package
- number of single packages per outer package
- construction and material thickness of the outer package
- measurements of the single package
- palletizing of the outer packages (layer-wise or stacked 3-dimensionally)

The example on the left shows three different stock keeping units for a given singular package. For each version the best packaging order and the optimum combination of outer package and palletizing is generated.



Solution variants of the two-step analysis



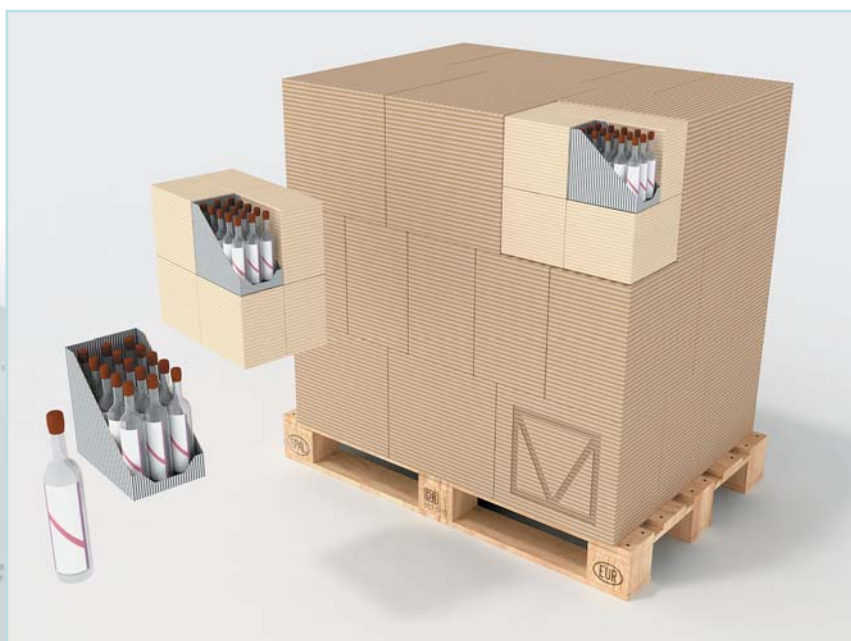
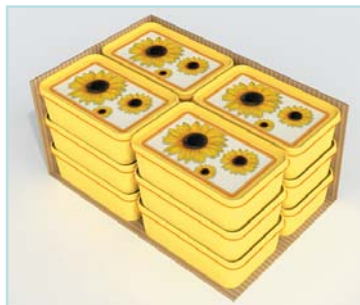
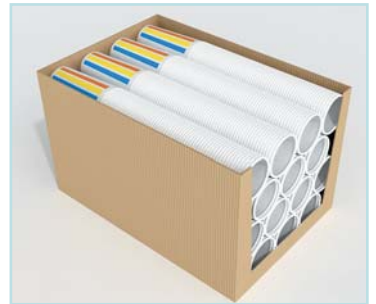
In the solution report of the two-step analysis the user is offered alternative package and palletizing variants. To give consideration to secondary goals, MultiPack also lists additional alternatives not meeting the optimum.

Rectangular, round, conical, hexagonal and oval products can be analysed in the two-step analysis. For the graphic display the user can choose between different tray variants. These trays can be shaped near to practice by the definition of the parameters that are conditioned by construction.

Three-step analysis

Small outer packages are often not palletized directly but united in bigger bundles in an additional step, e.g. shipping boxes.

Examples for two-step packaging



In the three-step analysis, Multi-Pack offers additional analysis parameters:

- arrangement of the units in the shipping box
- number of units per shipping box
- construction and material thickness of the shipping box

Single package, sales unit, shipping bundle and pallet



Efficient use of returnable containers

Optimized use of existing packaging formats

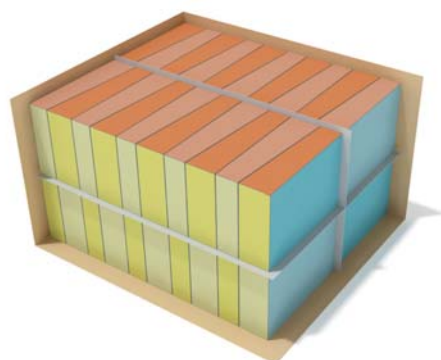
An important expenditure in the area of packaging is created by procurement, storing and management of a multitude of means of packaging. MultiPack can help contain this overflow of different packaging. When developing new product packages, it tries to fall back on already existing outer packages. In the two and three-step analysis it is possible to make a list of existing packages and to choose the best suited package. So it can be decided quickly if the introduction of a new sized package is worth the costs or if the use of an existing package makes more sense, even though it is not adjusted to the product 100 %.

So it is also possible to support the efficient use of modular returnable container systems with MultiPack.



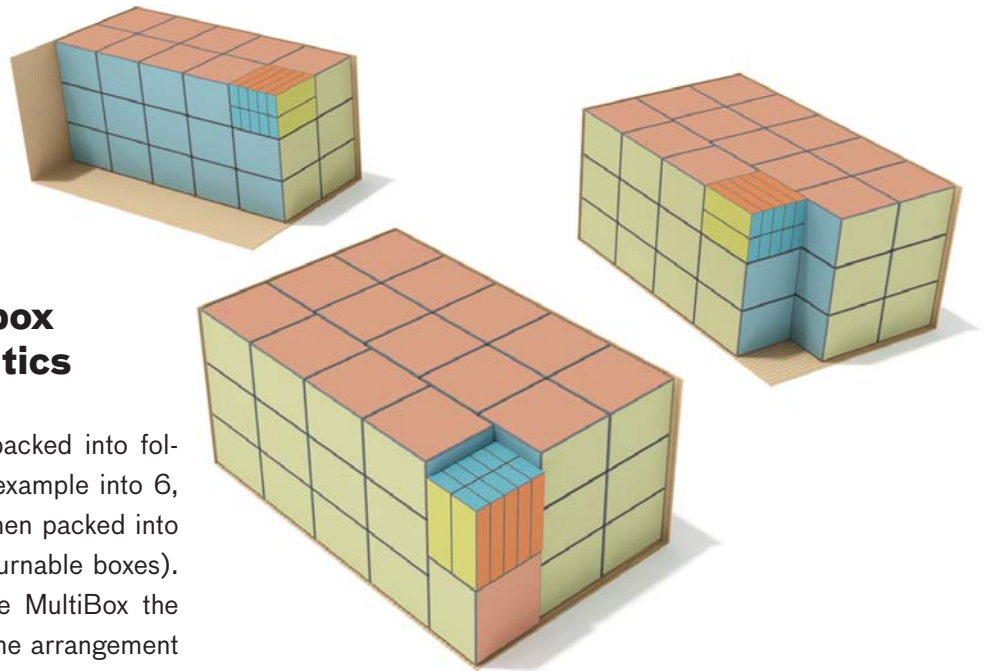
Individual problems demand individual solutions

The modules of MultiPack described so far solve most of the problems of packaging and stowage space optimization. Furthermore, some application-specific MultiPack versions for the solution of special problems are available.



Blank packaging – Optimized packaging for folding carton blanks

Glued folding carton blanks are packed with or without bundling, in big, mostly flat boxes. As the blanks are often of an irregular thickness, individual bundles are set in an offset pattern. To stabilize and protect the blanks partition walls and intermediate layers are used.



Multibox – Packaging of folding box bundles in pharmaceuticals

Pharmaceutical products are often packed into folding boxes which are bundled for example into 6, 10 or 12 pieces. The bundles are then packed into containers (cardboard boxes or returnable boxes). By means of the extension module MultiBox the bundling of the folding boxes and the arrangement of the bundles in the container are optimized simultaneously. To realize an exactly defined number of boxes per container, arrangement and number of bundles can be defined interactively.

Individually created packaging instruction forms

The printer outputs of MultiPack give an overview about the most important quantity and measurement data of the chosen packaging alternative. If additional customer specific information is necessary, Multiscience can integrate packaging instruction forms into MultiPack that are designed according to the individual customer's wishes.

All data required for the provision of the packaging instruction are stored by MultiPack. The standard printer outputs as well as the special forms can be stored in all common graphic file formats.

Additionally MultiPack offers the possibility to integrate interfaces defined by the customer, e.g. for the access to existing packaging databases.

Blatt-Nr.:	In Verpackung
1.	1200,0 x 800,0 x 145,0 mm
1.1	Palettengewicht 30,0 kg
2.	Karton-Abmessungen l x b x h 246,0 x 166,0 x 132,0 mm
3.	Bruttogewicht je Packung 0,000 kg
4.	Bruttogewicht eines Palettenstapels 30,0 kg
5.	Anzahl der Güter je Packung 1 Stk
6.	Anzahl der Packungen pro Palette 231 Stk
7.	Anzahl der Güter pro Palette 231 Stk
8.	Stapelhöhe (einschl. Palette) 1597,0 mm
9.	Abmessungen der Schutzverklebung
10.	Anmerkung

Verpackungs-Item:		Verkaufseinheit (VE):		Punkte auf Träger	
Masse in mm	Kübelanzahl (K):	Einheitsmaß (E):	Einheitsmaß (E):	Einheitsmaß (E):	Einheitsmaß (E):
Breite:	75	171			1200
Tiefe:	75	166			800
Höhe:	111	132			1623
Volumen in l:	6,1	3,4			1156
Gewicht in kg:	0,000	0,000			30

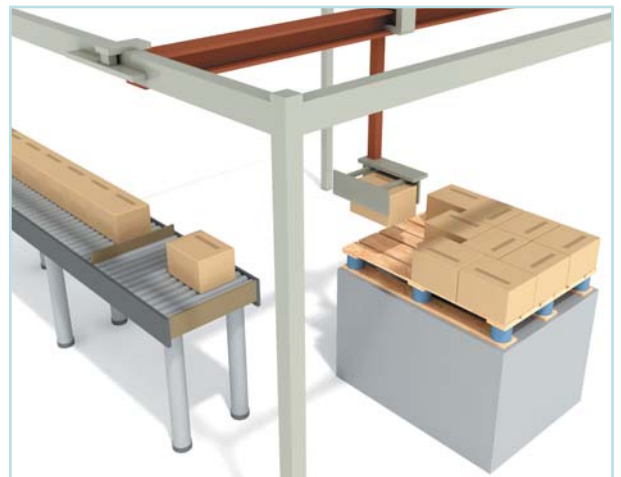


MultiPack teaches robots how to pack

MultiPack for robots

The use of articulated and gantry robots for palletizing is gaining more importance every day. Often the programming of the robots is made via teach-in, i.e. the points of gripping, support and dropping for each individual package on the pallet are approached and saved interactively. The programming of a palletizing pattern can last several hours during which the robot also is not available for production.

The package coordinates necessary for the realization of a palletizing pattern are available in MultiPack as a result of the packaging optimization. Via system-specific upgrades 'MultiPack for Robots' generates the necessary points of gripping, support and dropping for the realization of a palletizing pattern. For this, the specific characteristics of robots and gripper are taken into consideration, e.g. MultiPick (picking up several packages) with MultiPlace (set-

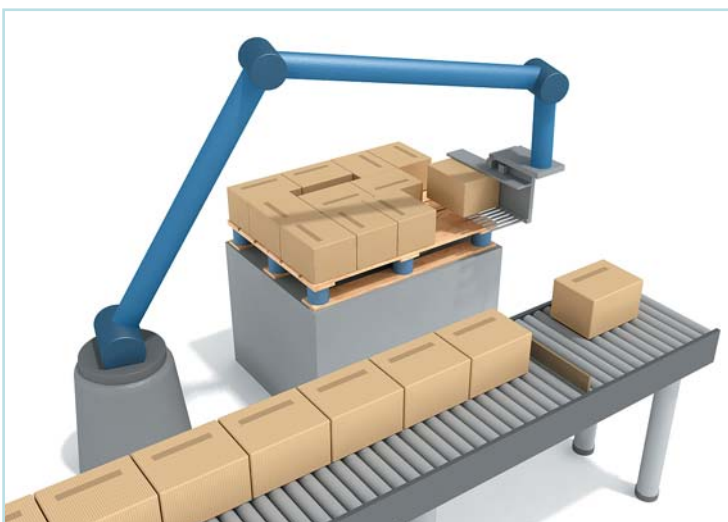


Gantry robot with clamp gripper

ting down all packages that were picked up) or SinglePlace (setting down individually or in clusters). For maximum robot utilization, MultiPack generates the gripper cycle series with the lowest time involved for each loading pattern. The resulting process of the palletizing can be visualized two and three-dimensionally.

Regarding transmission of control data, Multiscience has already implemented a multitude of alternative concepts, starting with the transfer of ASCII files up to the direct access to the memory elements of the robot control using for example S5 or S7 interfaces.

In the field of palletizing robots Multiscience cooperates with well-known robot manufacturers, but also with many small, highly specialized system integrators.



SCARA robot with fork gripper



MultiPack for layer palletizers

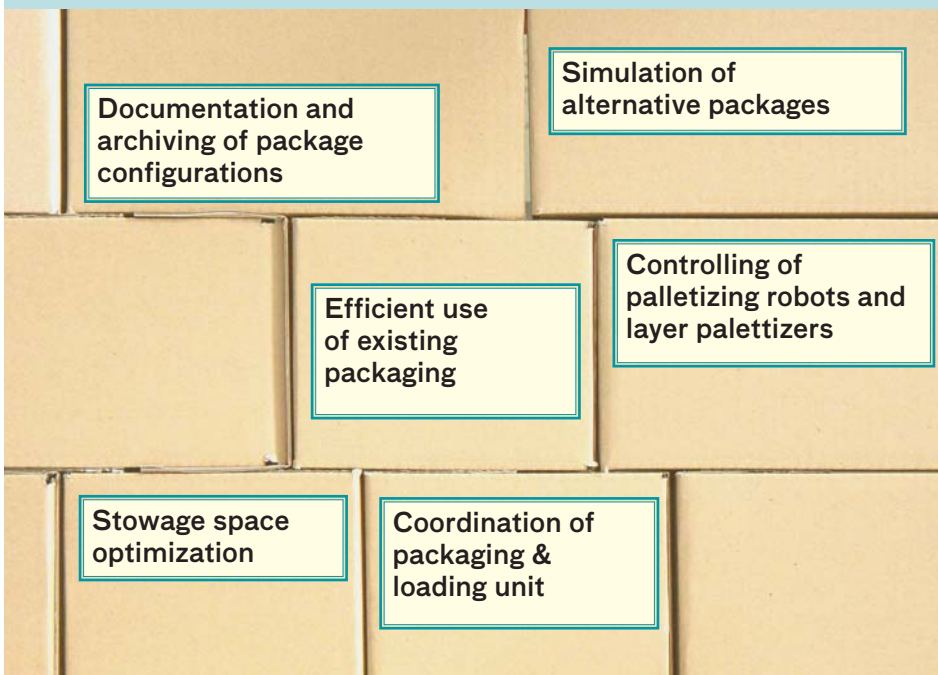
In 'MultiPack for Layer Palletizers' the established system configurations can be displayed with up to four infeed lanes. For each chosen loading pattern, MultiPack calculates the distribution of the packages on the different infeed lanes and the positions of the stoppers that have to be activated accordingly. Package allocation and stopper use can be changed interactively by the user. The push-out process of the packages and the layer image on the pallet resulting from pushing together the packages are visualized.

As the manual creating of control programs is very time-consuming, MultiPack is also used for the generating of control data for layer palletizers so that it is possible to quickly program the palletizer without specialized knowledge of the control system.



Special MultiPack versions are available for layer palletizers without stopper or with moveable stoppers.

MultiPack's scope of supply - overview



 **MultiPack**

Indispensable for packaging development and logistics.

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MultiPack is for example in use at:

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