Modular Palletising Systems

How do you benefit from configurable palletising systems through modularisation?

palletising

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Traditional palletisers are typically offered in a single standard model. In contrast, a modular palletising system allows customers to select from inter-changeable variants, creating a tailored solution. What is modularisation exactly and how does CSi do it?

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Introduction

When a customer comes to us with a palletising query, we consider the overall picture of what the customer needs. For example, a complete system where we integrate their existing conveyor belts into our palletising system. Such a system consists of many components, which in turn are made up of more components. In our 60 years of experience, we have created numerous systems and variants, and through modularisation we have combined that knowledge.

A few years ago, we started the modularisation process, where we combined the best practices and lessons from our experience and that of our customers, to create modular versions of our products. The end goal is to have the entire CSi range available in the best variants. By modularising our portfolio, we eliminate unwanted or restrictive features, and optimise, among other things, the quality, effectiveness, and power consumption of our products. Furthermore, the process from quotation to delivery is significantly accelerated which is a benefit for both us and the customer.

Modularisation defined

In the machine manufacturing industry, modularisation of a machine means dividing it into modules. Each module is designed individually to fulfil a specific task within the whole of the system, and all modules fit together to form the complete product.

Because modules are individual components, they can be assembled and disassembled, or replaced with a different variation on the module. Designing a variant of a module, or variant of a component within a module, allows us to offer different functionalities. These variants can be integrated into the product without impacting the entire system, because of the modular nature of the product.

Modularisation at sub-level

In different parts of the world, there are various system and machine standards. The requirements also vary across the different industries we serve (food, non-food, pet food, and home & personal care). To meet the diverse standards and requirements of our international customers, we have applied modularisation at a sub-level. This means we deconstructed the modules into components.

Let's have a look at our i-Pal, a robotic palletiser that roughly consists of seven modules, one of which is the gripper. If you look at a gripper on a sub-level, it is comprised of thirteen components (e.g. base, spacer, forks, guard plate). Most of these components have multiple variants, to configure the desired system specific to the customer.

For example, customer "Drinks Factory" might need short forks with a wide guard plate, while customer "Snack Manufacturer" may need long forks with a narrow guard plate.

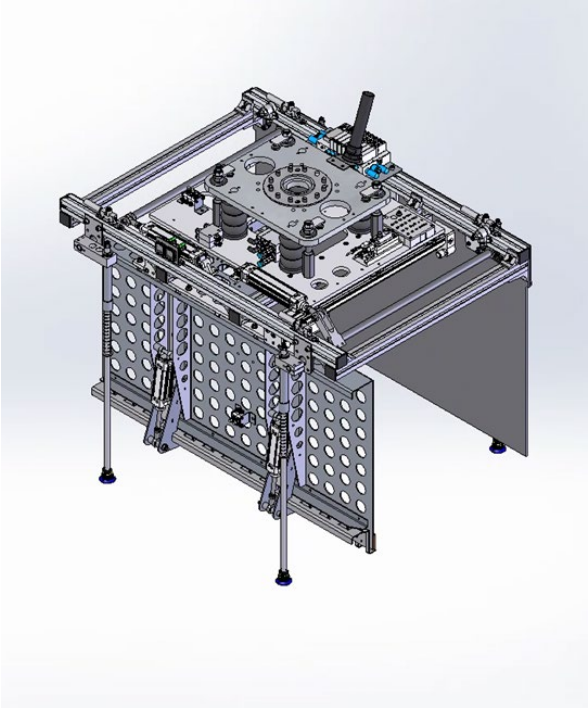

Figure 2 A gripper configuration with clamping plate instead of forks

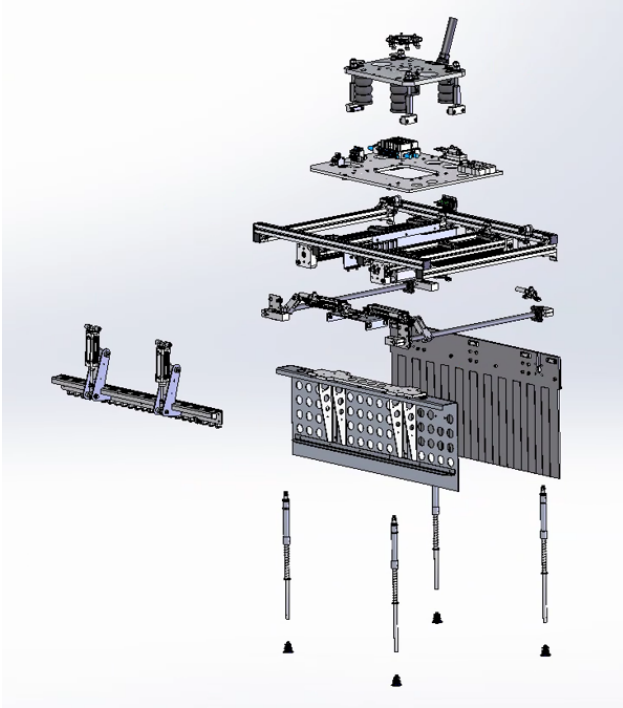

Figure 2 Exploded view of a gripper configuration with clamping plate

Having worked in the FMCG-industry for many years, we designed the modular variants to align with the specific demands of the sector. By modularising at a sub-level, we can provide customers with solutions that precisely match their needs.

Differences with traditional palletising system

Traditional palletisers come in one standard model. Basically, every customer gets the same model, except if they want modifications. In that case the engineering team maps the wishes of the customer and transforms them into modifications to the standard model. The engineering process takes a substantial amount of time, not to mention the amount of correspondence with the customer. Modifications also effect the production process of CSi Romania, who need to produce custom parts specifically for this customer.

The idea behind a modular palletising system is that the customer gets their specific wishes fulfilled by choosing between the modular variants. These fit together because they are interchangeable, creating the tailored modular palletising system, without additional engineering or production.

CSi's modular palletising systems

Our portfolio has largely been made modular, most importantly the layer palletiser Taros and the robot palletisers i-Pal and LINEx, including the associated robot cells. Modularisation of the box and pallets transport systems is planned. Once this is done, we will be able to offer quotes for fully modular systems.

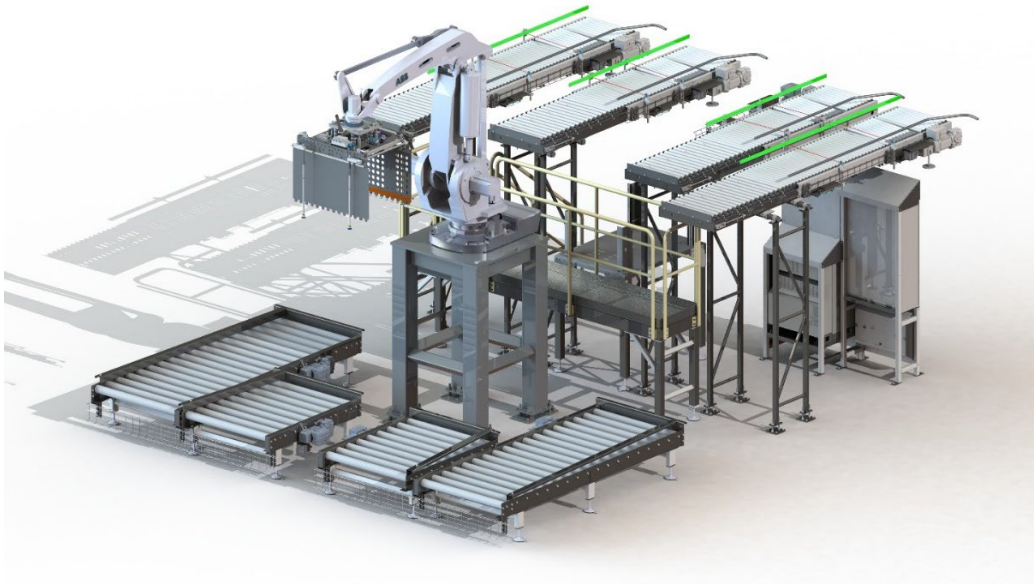

Figure 3 LINE^x robot palletiser, pictured without safety fence

When we say robot palletiser, it can mean two things: either the actual palletising machine or the robot cell of which the palletiser is a part. A robot cell consists essentially of six parts, which are:

- Robot palletiser: an i-Pal or LINEx, moves the boxes onto the pallet
- Gripper: picks up, holds, and puts down the boxes, attached to the robot
- Socle: the base for the robot
- Pick point: boxes arrive via a conveyor
- End point: full pallets leave via a conveyor
- Safety fence: surrounding the robot cell

The i-Pal consists of seven parts and has a skid included on which the parts are mounted.

Layer palletisers basically consist of the same parts, but they are integrated into the machine. Except of course for the robot and gripper, which are replaced by the Taros or C5000 machine.

Furthermore, a modular palletising system can be expanded with add-on features such as a layer sheet applicator, empty pallet destacker or layer centring device. These features are not modular of themselves but can be seen as modular parts to the palletising system.

The modular MOre software suite

The MOre SCADA & Systems Intelligence i4.0 Software Suite is also modular, as it consists of different functional building blocks. The MOre software allows the customer to control the palletiser, integrating daily operations and high-level data collection and analyses. Each functional building block has its own functionalities, and when combined with the palletiser they provide the customer with a tailored solution for their asset.

The modularisation process

Creating a modular machine is not an easy task and involves many steps and many people. To accomplish this immense task, a multidisciplinary team is assembled in CSi, including people from all parts of the company, like engineering, product management, projects, production and supply chain. They start with the existing machines, which are installed at customer sites worldwide. The first step in the process is to compare the installed base and the differences within these machines. By examining which variants appear in the installed base and why these variants exist, the multidisciplinary team can work further in a targeted manner, focusing on the most common and important variants. They also consider the reasons for the variants and whether these variants should be included in the standard version.

It is of course essential to look at the market as well. While the past can teach us what is desired, the future can also guide us. Technological developments in hardware and software are important to consider, as customers expect this too. The question is, "What functionalities do you want to be able to offer in the future?" Based on lessons from the past and expectations for the future, a selection of features is made for review.

The multidisciplinary team consists of various stakeholders, each thinking from their own perspective, ensuring a balanced overall view and the best result. The team reviews the features and identifies their individual main interests.

For instance, the supply chain specialist wants a component to be easily transportable and to minimise the number of brands. The product designer, on the other hand, is more concerned with a design that can easily be maintained, making it easier to continuously improve.

Then comes the hardest step: consolidating the interests. The features with conflicting interests are reviewed by the multidisciplinary team, and conflicts are resolved. It can happen that not all interests can be met, in which case the best possible compromise is made. After all interests have been addressed, a list of modifications to be made to the design is created. When these modifications are incorporated into the design, the modularisation process is finished.

Advantages of a modular system

In technological terms

Modular systems allow for easy reconfiguration of the palletising process based on changing production requirements. Since the system components (e.g., robots, conveyors, grippers, etc.) are standardised and interchangeable, it's easier to make adjustments as production volumes or product specifications change.

In terms of costs

Modular systems are typically more affordable to deploy than fully customised systems, as they reduce engineering and lead time.

In terms of service and maintenance

Since the system is modular, if a component needs maintenance or replacement, it can be done quickly, without significant downtime. Furthermore, new modules or upgraded technologies can be added to the system as needed, without a complete overhaul, keeping the system up-to-date with advancements in automation.

Impact on sustainability and environment

Modular palletising systems are designed to optimise energy use. The modular design allows for changes in motor, drives, and control systems to reduce power consumption.
As less engineering is needed, this means that less computer use and resources are necessary. So ultimately the production time will be a lot shorter.

The modularisation process involves adapting the machine and thus also provides room for material reduction or changing material choice to sustainable alternatives.
Fewer variations mean fewer different elements need to be produced, which allows production to be optimised, and residual material can be reduced.
Finally, if there are fewer or no modifications, less testing, less time, less energy and less material is needed.

Future perspectives

Boxes and pallet transport will also be modularised in the future. Furthermore, we will always continue to update with the product management department, keeping an eye on global technological developments, and new learnings from customers.

Conclusion

CSi's approach to modularisation in palletising systems offers significant benefits, such as enhancing efficiency, cost-effectiveness, and sustainability. By creating a portfolio of modular components, CSi enables customers to achieve highly tailored solutions without extensive custom engineering, resulting in faster production, reduced downtime, and lower costs. The sub-level modularisation further allows for precise adjustments to meet industry-specific standards, providing an adaptable and scalable solution.

Additionally, the modular structure supports sustainability goals by reducing material waste, energy consumption, and the need for extensive testing, all while accommodating future upgrades and technological advancements. Moving forward, the planned expansion to modularise additional transport systems and continuously incorporate new technologies will reinforce CSi's commitment to delivering innovative, flexible, and sustainable palletising solutions for an evolving global market.

How can we help you?

CSi palletising has 60 years of experience in realising all kinds of projects involving palletising and conveying equipment. Based on that history, CSi is very capable of carrying out all kinds of palletising projects. By gaining experience with both robotic palletising and layer palletising since the early 1980s, CSi has truly become a specialist in this field. We are happy to share this wealth of knowledge and experience with customers who are thinking about automatic palletising.

If you would like to receive more information, don't hesitate to contact us.

CSi palletising

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