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From manual packaging to reliable packaging automation

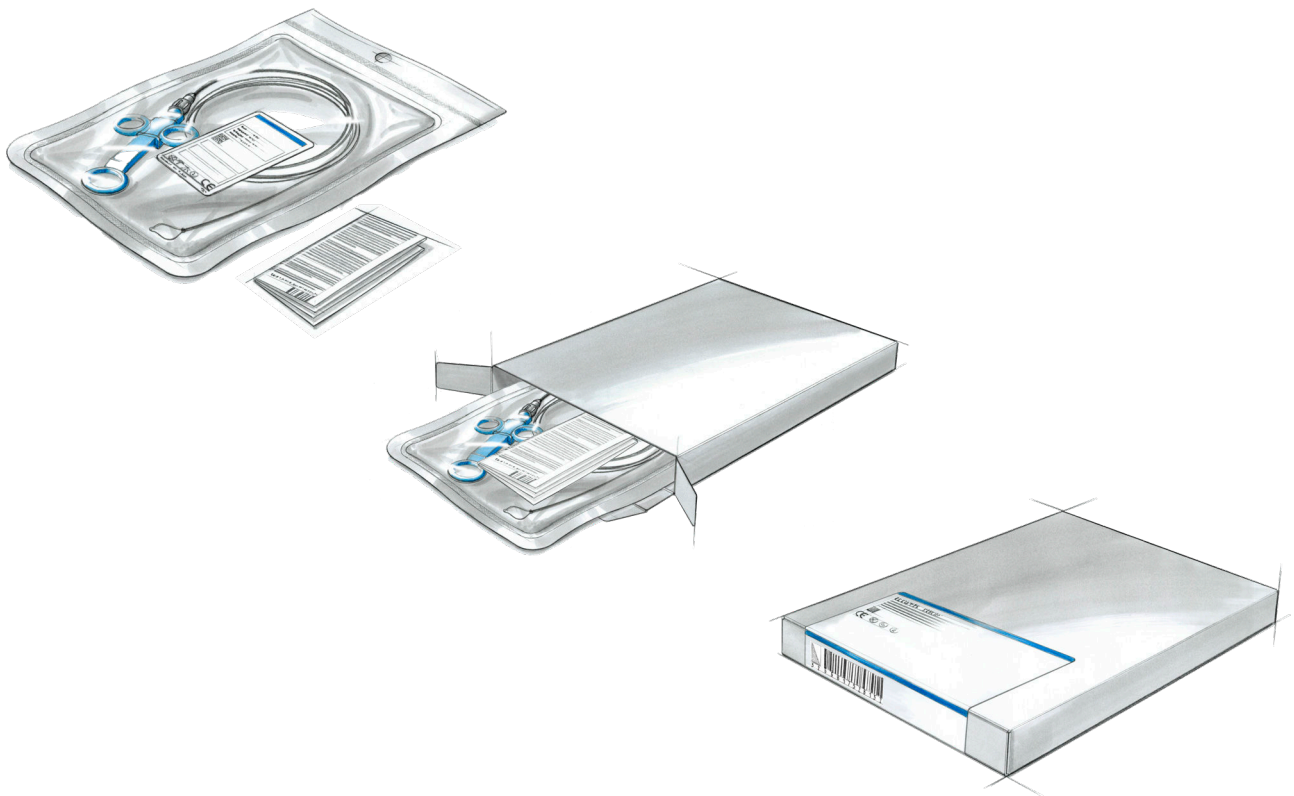
CASE STUDY

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Many manufacturers in the medical device and pharmaceutical industry turn to Ottobeuren when searching for a solution to automate the packaging of large-format pouches. There, Christ Packing Systems, a specialist in automating complex packaging processes, has developed an innovative solution for secondary pouch packaging. This case study describes a successful project for a U.S. company to automatically package pouches of neurovascular catheters into folding boxes. It shows how the transition from manual to fully automated packaging can be achieved, despite the particular challenges posed by the pouches' large, flat size and the sensitivity of the products they contain.

Christ Packing Systems' customers often bring in a wide range of sensitive medical products in pouches – including catheters, implants, and syringes. The key question is always: can the packaging of these pouches be automated? As a specialist in automated secondary and end-of-line packaging, Christ Packing Systems first analyzes the specific challenges of each product in order to develop a tailor-made solution.



Large-format pouches with sensitive medical products: a complex manual packaging process needs to be automated.



Manual packaging as a competitive disadvantage

“The products to be packaged are extremely delicate and subject to strict regulatory and country-specific requirements,” explains Janina Buß, Sales Manager at Christ Packing Systems. “As a result, many companies – even large corporations – consider certain packaging projects to be extremely difficult or even impossible to automate. For this reason, a sterilized catheter in a pouch is often packed manually to be on the safe side.”

However, this approach poses far-reaching problems. During vacation periods, temporary workers are often brought in, leading to higher rejection rates. The COVID-19 pandemic further exacerbated the situation: disrupted supply chains and illness-related staff shortages forced many companies to rethink their strategies. “Even small and mid-sized companies with a manageable product portfolio and only few packaging lines are now considering automation,” says Buß. “The pandemic has shown that companies relying on manual packaging are particularly vulnerable to production and delivery downtime – a clear competitive disadvantage.”



During the COVID-19 pandemic, medical device and pharmaceutical companies relying solely on manual packaging stations were heavily impacted by production downtime due to illness. Suddenly, they were temporarily unable to deliver their products at times. This posed a substantial competitive disadvantage.

Janina Buß, Sales Manager at Christ Packing Systems

Tailor-made solutions for supposedly 'difficult to package' products

More than any other company, Christ Packing Systems specializes in the automated packaging of products that customers consider 'difficult to package'. "Whether it is stents, catheters, or syringes pre-packaged in pouches, we help our customers to automate even the most complex manual packaging processes. The focus is always on the integrity of what are usually high-value products and comprehensive safety checks throughout the packaging process – and not just to meet regulatory requirements like the FDA's labeling and inspection regulations," says Jörg Aurbacher, Managing Director of Christ Packing Systems. "When delivering a catheter for heart surgery, you simply have to make 100 % sure that everything is packaged absolutely securely."



With our decades of experience in large-scale and complex packaging projects, we develop perfectly tailored packaging lines that not only meet our customers' current requirements but are also scalable to support future growth – all while ensuring full compliance with regulatory standards. Jörg Aurbacher, Managing Director of Christ Packing Systems

Challenges in secondary packaging

The requirements for secondary packaging are therefore extremely high: the pouches must be securely packed into folding boxes along with various accompanying documents. Afterward, the boxes must be closed and additionally sealed with tamper-evident protection. Different closure techniques, such as tuck-in flaps or hot-melt adhesive closures, are possible. Secure tamper-evident sealing is particularly important for these products, as they are already sterilized in their primary packaging – and in some cases even pre-coated with active ingredients on the inside of the pouches. An intact and tamper-proof secondary packaging is therefore essential for manufacturers. The folding box's seal must be designed to allow for one-time opening, with clear and visible evidence of tampering.

Another critical step is the precise application of labels to the folding box, such as U-shaped (i.e. three-sided) labels that ensure readability from all angles. For doctors and medical staff, it is crucial to be able to identify product information quickly and clearly. These labels often contain detailed information such as product type, quantity, weight, and expiration date, and they can cover up to 70 % of the packaging surface. In this way, the product is individualized in a legally compliant manner and effectively protected against tampering. In this specific project, a 37 cm (14.5-inch) label was applied to the folding box.



Complex secondary packaging: a 37 cm long U-shaped label is to be automatically applied to the folding box.

Safety and precision through automation

Additional challenges arise from a diverse product range with numerous variants, which increases complexity and the risk of mix-ups. The packaging process must therefore ensure that the labels are clearly readable and easy to scan, and that the contents – including the product and the accompanying documents – exactly match the information on the folding box. “If a surgeon in the operating room pulls out the wrong catheter from the pouch, the manufacturer’s credibility would be irreversibly damaged,” summarizes Aurbacher.

Especially for manufacturers who still rely on manual packing stations, it is often difficult to imagine that such complexity in secondary packaging can be effectively managed through automation. “However, our customized, precisely coordinated packaging solutions continuously prove that even the most complex requirements can be implemented reliably and efficiently,” explains Aurbacher.

The modular cartoner: key to project success

“The neurovascular catheters in this project are manufactured under the most stringent cleanroom conditions and carefully packaged in pouches. But in the secondary packaging process, around 20 employees manually perform the tedious and repetitive task of carefully folding the pouches and placing them, along with accompanying documents, into a flat 30 x 30 cm folding box,” explains Jörg Aurbacher, who has successfully implemented numerous international packaging projects in the medical device and pharmaceutical industry.

“In order to be able to automate such manual packaging processes, we developed our BoxTeq cartoner as a modular base machine. Only through the precisely coordinated interaction of specially designed servo motors, suitable sensory systems, and a highly responsive control system can the movements in the BoxTeq cartoner be synchronized in a way that ensures gentle and secure product handling. Over the decades, all our processes – from design to manufacturing, assembly, and programming – have been perfectly aligned to meet these requirements.”

Our BoxTeq cartoner has a modular design, allowing for a customized automation solution. Only the seamless integration of specially designed servo motors, suitable sensory systems, and a highly responsive control system makes it possible to switch from manual to automated packaging – because these are decisive for gentle processes at the transition from primary to secondary packaging.

Jörg Aurbacher, Managing Director of Christ Packing Systems

Customized solutions instead of standard machines

Even if the entire packaging line ensures the desired output rate and return on investment, the success of a project ultimately depends on the cartoner. It is the key to transitioning specialized primary packaging into easy-to-handle, automatable secondary packaging. Only when the cartoner is perfectly tailored to the specific requirements will the customer achieve the desired results.

“The transition from primary to secondary packaging is often the most critical stage for our customers. And it is precisely at this point – when the product is placed into the folding box – that a simple standard machine is no longer sufficient. Only a cartoner specifically customized to the product can deliver the desired outcome,” says Jörg Aurbacher.



Suitable sensors are essential for reliable automation.

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The BoxTeq cartoner, the centerpiece of the automated packaging line, is modular and customizable.

Specialized cartoner: customized perfection

“A modular base machine such as our cartoner is designed to adapt perfectly to the respective packaging project, because no two packaging projects are alike,” explains Florian Haertinger, Project Manager at Christ Packing Systems. “There are packaging lines with a wide range of performance classes that have to fit into the smallest possible footprint and require a higher level of functional integration. Others require higher output rates or redundant systems for increased reliability. This means the layout of the line can be very different – compact, elongated, or U-shaped. We clarify and document every detail in advance.”

This is why the interdisciplinary development team at Christ Packing Systems assesses the feasibility of the project right from the very beginning and systematically analyzes all relevant project

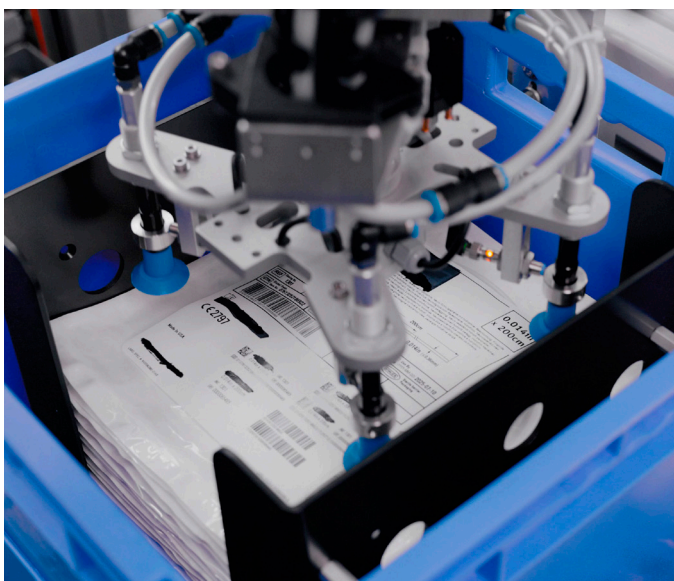
factors: product flow, formats, output rates, critical paths, and the adaptation effort on the base cartoner machine. The goal is always to implement the entire line successfully and efficiently.

“Our design department can adapt everything on the modular cartoner – except the packaging itself,” explains Haertinger. “The product packaging is the result of extensive transport and acceptance studies conducted by our customers within their companies and with their end customers. Only with the optimal packaging can they obtain approval for their product.”

The combination of modular technology, customized adaptation and precise planning makes the cartoner from Christ Packing Systems the key component of a successful packaging line.

The cartoner with the necessary tact and sensitivity

As Florian Haertinger and Jörg Aurbacher stand in front of the packaging line developed for their U.S. customer, it quickly becomes clear how much attention to detail went into the design of the cartoner. “On this packaging line, pouches containing neurovascular catheters are packaged into flat folding boxes,” explains Haertinger. “The pouches, which are stacked in transport boxes, are fed through an automatic infeed area with a buffer directly to the heart of the line: the cartoner. Due to its large format, the BoxTeq 1500 forms the basis for the customized cartoner. Its split transport chain and higher number of available stations allows for the integration of additional components such as labelers, printers, and code readers.”



Introduction of an internal means of transportation: the pouches stacked in transport boxes are fed to the BoxTeq cartoner.

Haertinger demonstrates scanning a barcode from a transport box before placing it into the infeed area. "By scanning, the transport box is inseparably linked to the batch and reliably documented. Once the batch has fully entered the systems, the packaging process starts automatically – accompanied by seamless documentation." The central control system records all relevant data, including batch start time and date, the corresponding format, product information, and batch duration. Even widely varying batch sizes can be reliably processed in this way.

Jörg Aurbacher points to the gripping tool that removes the pouches from the transport box and securely places them onto a bucket in the transport chain. "This is a pouch-specific pick & place tool. Due to the sensitivity of the pouches, we have equipped the top-down gripping tool with high-precision, fast laser distance sensors. These sensors continuously measure the distance during the insertion process to prevent damage. Additionally, the suction force is continuously monitored. If it increases unexpectedly, the picking process is immediately interrupted before any damage to the product can occur. The suction plate on the gripping tool is also designed to disengage to protect against worst-case scenarios, ensuring maximum safety."



High-precision gripping with laser distance sensors: a pick & place tool specially developed for sensitive pouches.

Precision and protection through advanced sensor technology

The correct large-format packaging inserts are already in place in the bucket of the transport chain, having been fed by an upstream friction feeder. Haertinger explains: "It was crucial in this process step to ensure that the accompanying documents were the correct ones. We verified this using appropriate sensor technology

before feeding them into the system. The properly oriented pouch is then placed on top of these documents and carefully folded at the back end, allowing it to fit into the flat box despite its extended length."



Customized automation: the correctly oriented pouch is placed on the correct accompanying documents and carefully folded at one end.

Seamless coordination: from transport chain to sealed box

In the insertion station, a servo-driven infeed pusher carefully and precisely guides the bucket's contents into an already erected folding box. The pre-glued folding boxes, securely held in place by the chain feeder, are picked from a large folding box magazine located above the folding box transport area using vacuum suction. "The magazine is designed in such a way that it can be safely refilled during operation," emphasizes Jörg Aurbacher. "But the real feat is performed by the carton erector: within just fractions of a second, the complex folding box is erected and positioned perfectly to be filled in synchronization with the insertion process. This is the result of our extensive motion studies in the CAD system as well as hands-on testing with our assembly technicians at the real machine."



The carton erector: within fractions of a second, the box is folded and positioned perfectly to be filled in synchronization with the insertion process.

Once the bucket's content is inserted into the folding box, the flap closes securely close the folding box. As soon as all pouches from a transport box have been processed, the box is automatically discharged, while the chain feeder moves the cartons in perfect rhythm toward the end of the cartoner.

In the cartoner, various sensor systems are used depending on the project – ranging from simple light sensors to complex camera-based pattern recognition. "These systems check serial numbers, print quality, flap closures, barcodes, and labels, ensuring the presence of the correct documents, security labels, and folding boxes," explains Florian Haertinger. He adds, "Any errors in the packaging process result in immediate rejection. This guarantees maximum process reliability and quality – just as our customers expect."



The closed, labeled and sealed folding boxes are conveyed to the downstream case packer.

The sensor technology is so precise and reliable that our customers notice here the clearest difference compared to manual packaging – they can truly feel the added security. Florian Haertinger, Project Manager at Christ Packing Systems

Paving the way to an automated future

Automating complex packaging processes is a crucial step for medical device and pharmaceutical companies to ensure long-term quality, efficiency, and competitiveness. A customized cartoner very often plays a key role in successfully transitioning from manual packaging to full automation.

At the heart of this transition are maximum safety and efficiency. A cartoner designed precisely to meet customer needs enables gentle product handling while ensuring seamless compliance with the stringent requirements for the transfer from primary to secondary packaging. This allows medical device and pharmaceutical companies to maintain full control over their highly regulated processes – even as production volumes rise and processing speeds increase.

“Every project is a partnership in which we make our customers’ requirements our mission,” emphasizes Jörg Aurbacher. “Through our solutions and close collaboration, we help enhance efficiency, optimize processes, and strengthen supply security for patients worldwide. Together, we set automation standards that meet not only today’s challenges but also those of the future.”



AT A GLANCE

Automation of a complex manual packaging process in the medical device industry, using neurovascular catheters in large-format pouches as an example

SITUATION

A leading U.S. medical device company was searching for a solution to make the secondary packaging of sensitive neurovascular catheters in large-format pouches more efficient and secure. The existing manual packaging process had reached its limits due to increasing production volumes and stringent regulatory requirements.

CHALLENGE

Products developed through decades of medical and pharmaceutical research require scalable, safe, and reliable packaging processes to succeed in the market. This is only achievable with automation solutions specifically designed for what are typically highly sensitive and high-value products.

- Efficiency enhancement: reducing reject rates while increasing processing speed.
- Product protection: ensuring that the sensitive catheters are not damaged during the packaging process.
- Regulatory compliance: implementing serialization, tamper evidence, and traceability in accordance with strict regulations.

SOLUTION

Christ specializes in automating complex packaging processes for the medical device and pharmaceutical industry. Based on the proven BoxTeq 1500 base machine, the cartoner's actuators and sensors were specifically adapted for pouch-packaged products. The BoxTeq 1500 cartoner was customized to:

- gently process pouches.
- precisely assign and verify accompanying documents and labels.
- digitally monitor and seamlessly document the entire packaging process.

RESULT

With the customizable BoxTeq cartoner from Christ, even supposedly 'difficult-to-package' pouches can be safely and reliably placed into large, flat folding boxes. The result is consistently high packaging quality with minimal waste.

REQUIREMENTS

- 1:1 automation of a highly complex manual packaging process
- Retaining existing materials and processes without revalidation
- Meeting the predefined cycle rate with minimal wastage rates
- Automated folding of pouches without damaging the product
- Precise insertion of the correct user and product information
- Legally compliant documentation of the cartoning process
- Seamless integration into the available production space

IMPLEMENTATION BY CHRIST

- Automated infeed system to the cartoner
- Secure pouch handling via sensor-assisted suction
- Reliable quality control through cameras, sensors, and software
- Optimized drive configuration for all product-touching movements to ensure gentle handling
- Integrated downstream processes such as tamper-evident sealing and labeling within the cartoner for optimal space utilization



