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GROUP

A new direction for hygienic secondary packaging

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Langen Group believes that truly hygienic secondary packaging will be a core requirement for the food manufacturing industry in the years ahead. As a result, we have taken the initiative to develop secondary packaging machines that are truly hygienic. In a world where there are as yet no consistent standards in place, we have analysed needs, consulted with customers, carried out our own research and moved ahead in developing the best-performing machine available anywhere.

Executive Summary

The new generation of Langen hygienic packaging machines have been designed according to the seven key principles we identified as being essential for making breakthroughs in hygiene performance:

- Solid components only, preventing bacteria from building up in the first place.
- Fewer flat and horizontal surfaces, minimise the potential for dust and dirt to settle, while also preventing water from pooling anywhere on the machine.
- Minimum contact, cutting the number of places where one surface touches another.
- Modular assemblies, making it easier to remove components and assemblies for thorough cleaning.
- No hidden dust traps, avoiding the use of cosmetic features, such as conduits and ducts to hide wiring, which also provide a safe haven for bacteria.
- Easy to clean materials, with low levels of surface roughness, use of stainless steel and active review of new materials.
- Simplification, taking out unnecessary components and reducing the number of moving parts.

This paper focuses on the family of new hygienic secondary packaging machines that have been developed as a result of our own development work. It ends with three key developments that we believe are changing the rules for secondary packaging:

1 To meet higher operational efficiency standards it is essential that all future secondary packaging machines should meet exceptionally high levels of hygiene.
2 Packaging manufacturers have to work as partners with their clients to help them achieve higher standards of integration and efficiency.
3 There is no fixed standard of excellence: instead, this is a never-ending process of improvement in which we all have to play our part.

This paper explains the process we have followed to set new standards for the entire industry, and introduces the ground-breaking new machines that will redefine hygiene standards in secondary packaging from now on.

A key priority

In recent years there has been a significant change in priorities within large food manufacturing companies. Concern about possible contamination in packaging processes has risen from being a topic of middle-ranking importance to being a more urgent priority. We at Langen Group have also noticed a rising level of demand for assured hygiene standards in secondary packaging, as well as for the processes that involve direct contact with food. So what is driving this evolution in thinking?

It's certainly not because attitudes to contamination in general have been lax: far from it. The food industry, and those related to it, including food supplements, health products and pharmaceuticals, has always rightly prided itself on implementing exceptionally high standards of hygiene in manufacturing processes and primary packaging. Increasingly strict regulations imposed by the Food & Drug Administration (FDA) in the US and equivalent bodies in other parts of the world, notably in the European Union, have reflected the drive to eliminate contamination in the food chain as far as is humanly possible.

That is, of course, good news for us all. As "consumers" we all depend on food that has been processed, at least to some extent, and packaged in a central facility, before being moved to the point where we can buy, prepare and eat it. Every one of us will suffer if hygiene failures become widespread. And there is also a huge commercial price to pay for failure.

In most countries there have been contamination scandals of greater or lesser importance over the past few years. They are not frequent but, rather like a major natural disaster, when they do happen, they have devastating consequences. Brands can be undermined, public trust, built up over decades, lost overnight, while financial and share price damage can last for years.

This is not simply a matter of altruism or responsibility: major contamination events could come close to destroying a business. They have to be avoided, at almost any cost. All these points are well-understood across the industry. So why is there a greater sense of urgency today than in previous years? And why is there a greater focus than before on secondary packaging?

A major manufacturer of breakfast cereals and many other branded food products was forced to recall 28 million boxes of a top-selling product because of fears that chemical contamination from packaging was causing vomiting and diarrhoea. That company has since become a key pioneer in setting new hygiene standards for packaging.

Research studies have shown that leaching from specific forms of packaging into consumable products might be easier and more common than suspected.

- In Zurich a publicly-funded study showed that PVC linings led to an accumulation of plasticiser compounds within food products.
- Another European study revealed that cross-contamination of pork into halal products was growing, not because of contact between different forms of meat but because of the use of pork by-products in paper-based packaging.

This problem is extremely complex and has the potential to affect consumers of every kind.

New methods, new approach

One factor that is driving a new emphasis on secondary packaging is the continued search for much higher levels of operational efficiency. That involves rethinking all aspects of production processes and asset utilisation to seek performance improvement opportunities.

Production directors, for example, are seeking ways to avoid moving products from primary to secondary packaging lines, keeping activities within the same space and moving towards real straight-through processes. This simplifies operations, cuts down on the number of process steps, makes more efficient use of space and resources, potentially speeds up production and reduces costs. In a market where competitive advantage depends, not so much on one or two major breakthroughs but on dozens of small-scale incremental improvements, these changes are highly significant. The natural consequence, however, is that more tightly integrated production processes could potentially lead to a lower level of segregation between process phases. Some aspects of manufacturing and packaging now share the same space, with no “hard” divisions between the two. That inevitably means that secondary packaging is becoming subject to the same very demanding hygiene standards that are normal within primary packaging. In order to maximise operational efficiency and unlock the potential financial benefits of seamless, straight through processes, all packaging activities, procedures and equipment have to be levelled upwards, with secondary packaging coming much closer to meeting primary packaging standards.

The more seamlessly connected and highly integrated a process becomes, the more important it is to maintain absolutely consistent, and consistently very high, standards of safety at all times. If the machines are in the same room (no matter how large that room may be) they must operate to the same standards: there is no room for one safety level for primary packaging and a second, somewhat lower standard, for secondary.

Manufacturers and government agencies alike are working together in order to eliminate threats to public safety. By doing so, food manufacturers and processors will also safeguard the brands that are their most precious possessions. All stakeholders in this industry have a shared interest in reaching hygiene performance that is as close to perfect as possible, in secondary packaging as well as everywhere else.

Secondary packaging could represent the next frontier for hygiene improvement. Manufacturers, logistics specialists and retailers all recognise that bacterial contamination remains possible as a result of damage to packaging, which can be caused by problems in the packaging process or by clumsy handling somewhere along the supply chain. If bacteria are able to thrive on the external surfaces of secondary packaging machines, then somewhere, sometime, somehow contamination will happen: it’s a statistical certainty.

Langen Group vision

Langen Group is a leading player in the field of secondary packaging and, with a headquarters shared between North America and the European Union, has a deep understanding of evolving regulatory regimes in the two major global food processing centres. It has become very clear to us that a new approach to hygienic packaging equipment is needed: one that ensures consistency worldwide but is also modular enough to enable different players to build the right solution for their own needs.

Langen Group's view is that ensuring virtually the highest levels of hygiene currently achievable can be defined as the product of seven key principles:

The seven key priciples:	
1	Solid components only
2	Fewer flat and horizontal surfaces, with better water-shedding
3	Minimum contact
4	Modular assemblies
5	No hidden dust traps
6	Easy to clean materials
7	Simplify

1. Solid components only

The first rule of hygienic design is to prevent bacteria from building up in the first place. That means avoiding any components that have the potential to harbour micro-organisms, and perhaps the most important of these are tubes. Building machines from tubular steel can be cost-effective and simple and, in the past, most designers have believed that properly sealed tubes present no hygiene hazard. In fact, this is not at all true.

2. Fewer flat and horizontal surfaces, with better water-shedding

Dirt, dust and bacteria settle best on flat surfaces, which cannot be eliminated entirely from equipment design. Yet they can be minimised. The fewer horizontals there are in the core machine structure, the less likelihood there is of water forming pools and encouraging bacteria colonies to proliferate in the first place. The general rule to be followed here is that square shaped components are to be avoided, precisely because they provide too many flat, horizontal surfaces. Round components are to be preferred in every case, where possible. In the same way, large radius round surfaces are less likely to "snag" materials during cleaning, and they also do not have corners that are hard to wipe clean.

3. Minimum contact

Points of contact between components and sub-assemblies are very conducive to bacteria development. They thrive in the lines where one piece meets and fits onto another. The answer? Cut down the number of places where one surface touches another. Not only does that reduce the build-up of bacteria, it makes these potentially hazardous locations easier to clean.

4. Modular assemblies

Cleaning any piece of equipment sometimes causes more problems than it solves. Water is the best medium for bacterial growth and washing down, unless corrosive chemicals are used, can provide a welcoming environment for spreading contamination. For dry packaging machines, the answer is to make sure that all components and assemblies that are at special risk of contamination can be removed and taken to a separate location for cleaning, without compromising the rest of the machine. That is a process requirement which demands specific design strategies to make it work.

5. No hidden dust traps

Cosmetic design features are often inimical to good hygiene practice because they tend to gather dust. A key example is the use of conduits to hide piping and cables. At first glance the sight of uncovered cabling is alarming and offends everything we know of good design practice. But the fundamental requirement for “clean machines” is the ability to see everything. If you can see it, you can clean it. A conduit, however, is rarely disassembled or removed, leaving bacteria able to accumulate there undisturbed for enough time to thrive and spread. The same principle applies to screw heads, hollow bodies and all common components that have the potential to gather dust and dirt. Removing them altogether is the best option and reducing their number is a basic requirement.

6. Easy to clean materials

Choice of materials is clearly a key factor in hygiene performance. Manufacturers have used Stainless Steel wherever possible for many years, but there are many options available in this area, while the development of advanced new materials offers potential advances in the future. Manufacturers today will specify use of stainless steel with clearly defined surface roughness, down to a fraction of a micron.

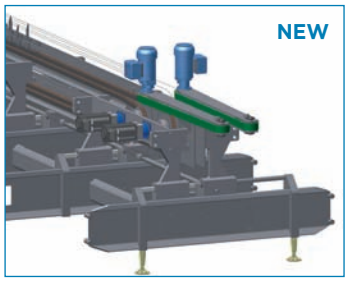
7. Simplify

At all times, designers need to remember that simplicity is the friend of hygiene and complexity is the enemy. Core structural and process designs, therefore, need to be re-examined, challenged and, where possible, rethought in order to reduce the number of moving parts, actions and components. Once existing designs are examined with a critical eye, it is surprising how much can be removed and how many problems can be engineered out of existence as a result.

Theory into practice

Langen Group has been a long-time innovator in its field and, from mid-2011 onwards, we have been managing a focused programme to develop a new approach to hygienic packaging that will enable secondary packaging processes to reach levels similar to those in primary food processes, doing so in a way that keeps costs under control. This development activity has now delivered a packaging solution that is cost-effective (purchase price and running costs in line with conventional machines), operationally highly efficient and sets unprecedentedly high standards for hygiene. The new approach can now be seen in three dimensional form in our C-1000™ and VENTO™ hygienic cartoning machines. Development of the new machines required three specific design stages and underlined the importance of an iterative design approach in which opportunities for improvement can be identified and all new features can be challenged and tested.

The initial design for a new C-1000™ hygienic cartoner combined good hygiene performance with lowest production costs, leading to potentially a good balance between modest investment and better performance. It is a far simpler machine, compared with the previous C-1000™, and has as a main feature a hooped framework with a minimum of bolted sections. A second approach was also taken, and this had the express task of adapting the previous C-1000™ in order to simplify our own production requirements. All unnecessary items were removed, voids and open spaces taken out, wherever possible, and the number of fastenings and contact points drastically reduced. In-depth peer review, however, led to a significant redesign, and this represents not simply a major development when compared to existing Langen Group machines, but a potential fresh start for the entire industry. This third design option is now the basis for our new family of hygienic secondary packaging machines.



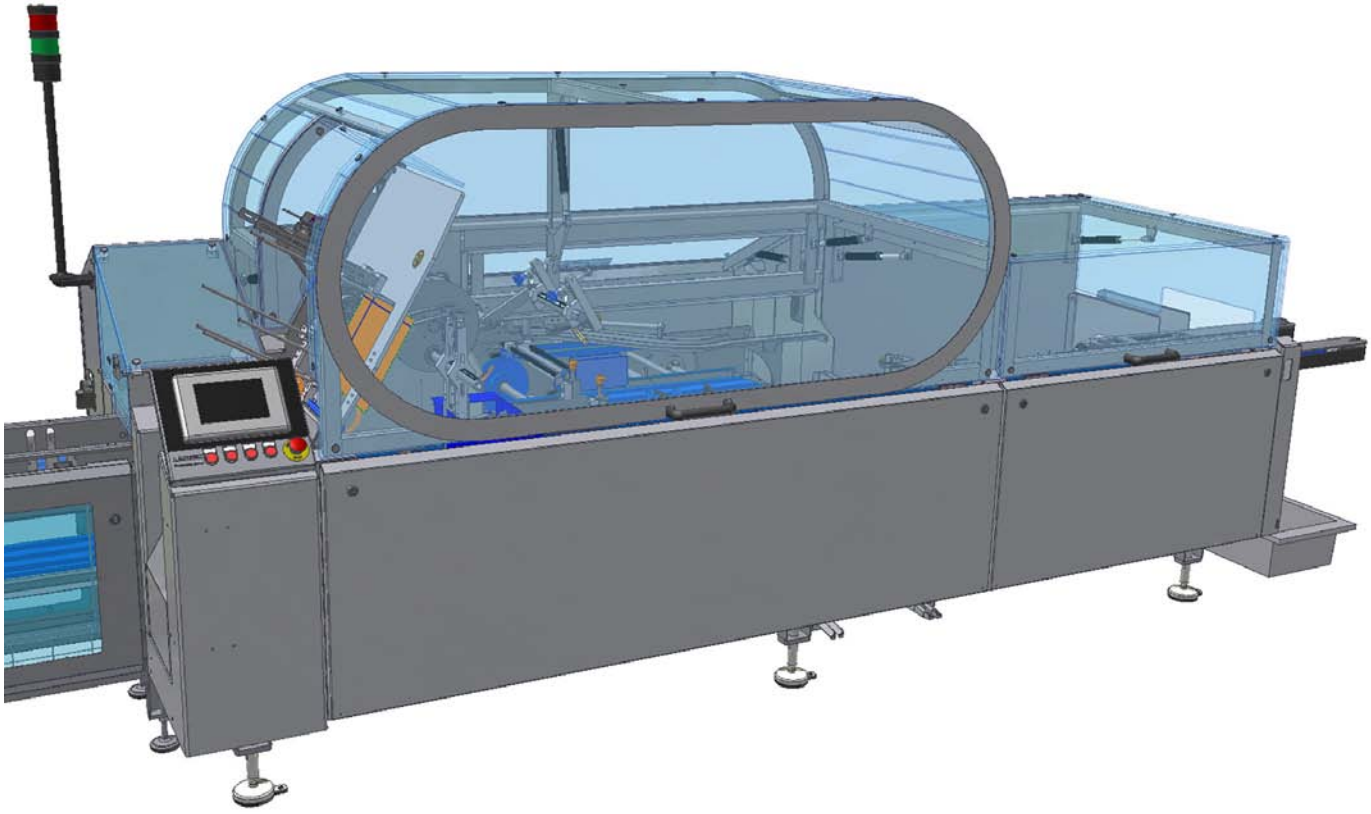
New design:

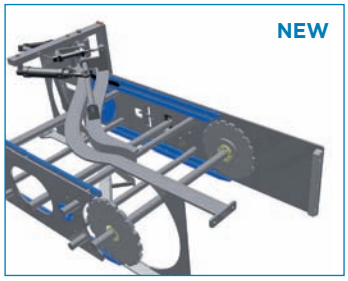
the existing C-1000™ is now evolving into a simpler, cleaner, more hygienic design, giving greater access to areas that require frequent cleaning and with a structure that is less likely to foster bacterial build-up. The new design also has the added benefit of being more efficient in operation.

The same design principles used for the new C-1000™ machine have been applied to the new version of the VENTO™, our end-load cartoner for smaller cartons. Once again, a radical approach has been taken to the core design in order to deliver improved hygiene performance. The new VENTO™ has a voidless structure, reduced number of parts, fewer contact points and fastenings, solid tubing for the framework and simpler, modular construction. Risk of bacterial contamination is reduced to the lowest level available on the market through strict application of our efficient, hygiene vision to smaller machines.

The new design approach is truly “voidless”, with no spaces to collect dust or bacteria, with the only open areas being clearly visible and accessible for fast and easy cleaning. All accessories can now be hung from strengthened upper members, and this makes all components visible and easy to reach. Nothing is hidden and everything can be cleaned fast and effectively.

Perhaps the most important change is the way that the magazine assembly, responsible for moving product through the packaging process, has been completely redesigned. In line with our guiding principles, the new design is simple, has fewer moving parts, is open to view and easy access, while having all necessary operator safety features in place.





Simplification in action:

both the C-1000™ and VENTO™ contain a smaller number of moving parts than previous versions. The new conveyor assembly is far simpler than before, making it not only more hygienic but also more efficient and less likely to fail.

In summary

In summary, by basing everything we did on clear principles and by searching, through peer group review, for every possible opportunity to make incremental performance improvements, we have developed products that represents a step-change for the industry. It delivers:

- Reduced likelihood of bacterial build-up
- Easier cleaning, reaching much higher hygiene standards
- Improved operational efficiency, compared to conventional products
- Better ergonomic design for operators, leading to higher performance levels
- Exceptionally high safety levels, fully compliant with regulatory requirements
- Modular structure, enabling simple and comparatively low cost system enhancements

All of these basic operational improvements have been achieved as outputs from a successful project to deliver the highest level of hygiene performance in secondary packaging. We draw some simple conclusions from this project.

First, it is not possible to achieve the desired levels of efficiency in process design and management without ensuring that secondary packaging can comply with exceptionally high levels of hygiene performance. Hygienic machines, such as our new C-1000™ and VENTO™, will soon cease to be specialty items and will very rapidly become the norm within the food and other industries with exceptional hygienic demands.

Second, packaging manufacturers now have to think of themselves as partners to their clients in delivering the major operational efficiency gains that food manufacturers (and in the future, all manufacturers of sensitive products, such as medicines and supplements) need to achieve. The act of simplifying, speeding up and integrating processes and process stages is not a nice to have but a basic necessity. In order to be as efficient as possible, without compromising the integrity of products, secondary packaging has to be integrated with other process steps. Failure to achieve this form of efficiency and integration will lead to competitive disadvantage. Packaging specialists have to help their clients change in positive ways.

Third, this is a never-ending quest for excellence. There is no fixed “gold standard” today: there is only the drive to do better than ever before, and then keep searching for potential improvements. Langen Group has worked with manufacturers and regulatory bodies to ensure fitness for purpose and full compliance. Yet the revelation for us in this process is that we had to develop our own standards of excellence in order to deliver the performance improvements that the industry requires.

We have reached the point when the entire food packaging industry takes a major step forward. We believe it will never be the same again. Once manufacturers start to unlock the full benefits that truly hygienic secondary packaging machines can deliver, in terms of operational efficiency, process simplification and reputational safeguarding, there will be no turning back. Langen Group is proud to be setting the pace, and confidently expects to keep doing so in the years ahead.

All information given in this document is dependent upon final machine specification, infeed arrangement, product type and carton specification.

AMERICAS	Canada	Ph: +1 905 670 7200	sales-americas@langengroup.com
EUROPE, MIDDLE EAST & AFRICA	The Netherlands	Ph: +31 24 648 66 55	sales-europe@langengroup.com
ASIA & AUSTRALIA	Singapore	Ph: +65 62 89 37 88	sales-asia@langengroup.com
	Thailand	Ph: +66 23 02 14 15	sales-asia@langengroup.com

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