Plastics in consumer goods: fresh strategies for more sustainability

Plastic and sustainability – at first glance, these terms do not seem to fit together. Plastic waste, mainly single-use plastics and microplastics, polluting the sea is an issue that has become increasingly the focus in recent years. For example, according to a Roland Berger study on sustainability, 12 million tons of plastic enter the ocean every year, which is around eight million units a day.

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Plastic waste, mainly single-use plastics and microplastics, polluting the sea is an issue that has increasingly become the focus in recent years.

Likewise, researchers at the National Oceanography Centre (NOC) have found that there are currently an unimaginable 12-21 million tons of microplastics in the Atlantic – a huge danger to animals and humans. However, when packing and transporting food and other consumer goods (F&C), there is no real alternative that is more hygienic, safer, more efficient and cheaper.

What is certain is that companies and decision-makers urgently need to find ways to promote sustainability and environmental protection, while still packaging their goods and containers reliably and safely. Smart packaging lines, innovative robotics, technological innovations and AI can support this.

With the world eagerly awaiting the UN's Climate Change Conference (COP26) to be held in Glasgow, Scotland, in November 2021 the issue of sustainability is gaining momentum. More and more companies are taking environmental measures, planning green actions and developing innovative approaches – also when it comes to plastics.

And while the amount of plastic packaging produced, used and disposed of worldwide urgently needs to be reduced in this context, it is also important not to completely ignore the advantages of plastics over alternatives in the context of balanced sustainability.

There is a lot to be said for plastic packaging

Plastics in packaging include a few benefits which cannot be dismissed out of hand. For the producer, these polymers provide a safety barrier to protect a variety of contents. Furthermore, they are easy to shape – for an appealing shelf presence – and they also offer convenience for transportation.

Consumers on the other hand want convenience, choice, product integrity, value and more sustainable practices. Here it is important to remember that whilst there is a lot of debate about plastics and rightly so, it still does have environmental advantages over other alternatives, for example metals or glass, which can be very energy-intensive to produce, ship and recycle.

And even though unpackaged food is a trend in some cities and regions, in many places there is simply no viable alternative to plastic packaging for cost, hygiene and safety reasons.

Polymers provide a safety barrier to protect a variety of contents.

Focus on 'reduce, recycle, reuse and redesign'

Currently, producers are balancing between making commitments to reducing overall usage of plastics whilst maintaining product sales and safety, so we are seeing lower levels of plastic used within the container or packing. Manufacturers increasingly focus on light-weighting to reduce plastic packaging.

Moreover, there are changes in the composition of the plastics so they can be more easily recycled. Another development is an innovative format design like pouches or resealable bags – there is a new focus on less plastic and less waste of end products.

The trend is to reuse and redesign packaging, containers and more. So to be

more sustainable but equally aligned to customer's objectives, manufacturers should develop new packaging strategies based on the four 'R's': reduce, recycle, reuse and redesign.

Only a minimal proportion of the plastic is recycled

We have all seen the terrible images of plastics in the eco-system, harming wildlife and the oceans in general. Today, we produce about 300 million tonnes of plastic waste every year. That is almost equivalent to the weight of the entire human population. Approximately 20% of total packaging waste materials are plastics, about the same as glass and less than paper or cardboard – paper however can be more easily recycled.

Sadly, according to the Environmental Protection Agency only a very small fraction of the plastics produced is recycled, approximately 8.4%. And despite all the discussions about more sustainability, plastics production is set to increase for decades to come, with some forecasts predicting a doubling of production by the year 2050.

In particular, strong growth in flexible plastic is expected, but only slightly ahead of rigid plastics.

Global initiatives to reduce plastic

So is there no regulation at all, you might ask? Often mentioned are the UN Sustainable Development Goals, including climate action and responsible consumption and production. There are also many and diverse regulations in place globally, all pushing for a reduction of plastic usage within our society.

Some examples are the bans on single-use plastics, such as straws and cups or plastic bag reduction strategies in the EU which are linked to the Directive 2019/904, and which officially became law in July 2021. In other regions, the US, India and China have implemented their separate plans.

Global consumer goods producers have been making commitments for some time as well. These pledges are diverse in their make-up. Some are in favour of increasing the proportion of recycled PET in products. Others strive to make packaging more recyclable or rework the design of packaging and containers to use less plastic.

Six challenges and opportunities for automation

All of the above changes present potential challenges, and manufacturers need to develop new strategies and find innovative technology to overcome these hurdles – with automation as the foundation of all these plans.

The following examples use specific application scenarios to show where producers can start to drive change.

● Sealing: Real-time monitoring

How can a manufacturer be sure that the packaging is fit for purpose in the event of material changes? Can the manufacturer still use the same equipment and configurations that it uses today? For example, a vertical form fill seal machine (VFFS) has many variables such as speed, pressure, synchronisation, temperature and more.

Very close control of these variables is required to achieve the correct result. How can the result be tested in real time?

To be able to monitor multiple variables in real time, such as material thickness, contact time, temperatures and more, the manufacturer needs an automation solution that can collect all applicable data via common communication methods 'at the edge' (at the machine level).

In addition, a facility to share and visualise is required. In the future, more and more AI will be embedded in a control system, so that the development is increasingly moving in the direction of self-optimising machines.

● Forming: High-performance vision systems minimise faults

For producers of trays, bottles or packs who are both trying to reduce the amount of plastic being used and their composition, it is important to ask what effects changes like these might have on the integrity, colour or shape of the item.

How are processes affected and how can automation be best used to check the characteristics?

As well as the process of creating the container, that requires close temperature control combined with the physical action like pressure, a key task is the inspection of the container to ensure its integrity.

Ensuring no defective items enter the market-place requires high-performance vision systems with the necessary tools to detect such issues as microholes in plastics.

● Winding: Close monitoring and control of film

With changes in material composition, it is essential to analyse if machines such as flow wrappers still maintain throughput and tension control without affecting the output or quality of the end product.

Only by close monitoring and control of the film, will a product be made that meets the specification, avoiding wrinkles and stretching and therefore negatively impacting downstream processes.

● Wrapping: Temperature and motion control

Similar to sealing, material changes can affect performance: Are integrity and stability still guaranteed when wrapping, for example?

An application is required that guarantees close control of temperature and movement, maintains tension and ensures that a secondary or tertiary packaging is wrapped correctly.

Manufacturers increasingly focus on light-weighting to reduce plastic packaging.

● Handling: Seamless communication between systems

When reducing packaging, producers must determine whether handling workflows supported by sorting or pick-and-place solutions are accurate and easy to repeat – an example being placing trays into retail-ready tertiary containers.

A key aspect of handling is being able to 'see' the products that enter the packaging area, as well as fast communication between the image processing system, the conveyor belt and the robot – all while respecting the required throughput.

In addition, the robot's configuration may need to be changed to accommodate new film materials.

● Closing: High-resolution servos are key

The previously mentioned trend for weight reduction can change the size and shape of containers, which can also affect the sealing process and other related workflows.

Additionally, forces and torques can lead to scrap or production failures, which can lead to further problems.

Many sealing techniques such as capping rely on servo control. High-resolution servos connected via a machine network like EtherCAT are therefore essential.

Supporting sustainability

With its comprehensive and integrated innovative-automation technology platform, accompanied by a wide range of services available worldwide, Omron offers a tailored range of solutions to support all of the above challenges.

A global presence, a global network of integration and operation partners and an internal focus on the WHO's sustainability goals as an Ecovadis platinum certified company, Omron is the right partner in this path to build a more sustainable future. ■