



Whitepaper

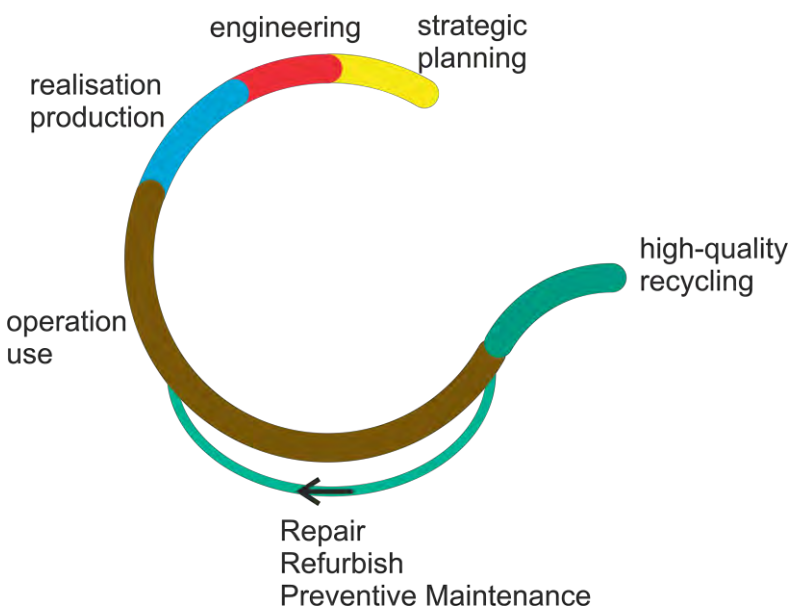
Baumer hhs Embraces Sustainability and Circular Economy for a Greener Future

ECODESIGN BAUMER HHS PRODUCTS

Eco-design integrates environmental aspects into the product development process by balancing ecological and economic requirements. It considers environmental aspects at all stages of the process, striving for products that make the lowest possible environmental impact throughout the product life cycle (EEA/UNEP, 2001).

I. OUR AMBITION

Baumer hhs is committed to assisting our clients in adopting sustainable practices and ensuring that our products are designed to minimize their environmental impact throughout their life cycle.



We at Baumer hhs are constantly taking steps to enhance the sustainability of our products, knowing that the journey is never over.

We are implementing measures that impact all stages of the product life cycle:

a) Strategic planning

Sustainability goals are a mandatory consideration during the specifications and requirements phase of the development cycle.

b) Engineering

The design phase is crucial for sustainability as it sets the foundation for the product's ecological impact. We prioritize the use of easily recyclable, high-quality materials, durability, reparability, and low energy consumption. We strive to ensure that our products utilize materials efficiently in packaging production and minimize waste. Additionally, we focus on creating products that can utilize adhesives made from renewable materials.

In our design process, we are increasingly utilizing state-of-the-art simulation methods to significantly reduce the number of development loops and prototypes.

c) Realization/Production

In production, we minimize material and energy use and collaborate closely with our suppliers, aiming to reduce production waste to the lowest possible level.

We employ thorough testing procedures to ensure the quality of our products and strive for continuous improvement in this area.

d) Operation/Use

Our aim is for customers to use our products for as long as possible. While we are currently in good standing, we are always striving for improvement. Implementing preventive or predictive maintenance can help us avoid

production disruptions by addressing potential weak points before they become issues. In case a repair is necessary, we offer refurbished and reconditioned replacement products through an exchange program to ensure immediate availability. By remanufacturing and reconditioning defective devices, we are able to save a significant amount of resources.

Our products are designed to help customers achieve sustainability goals through efficient packaging that uses minimal materials and energy.

e) High-quality Recycling

At the end of a product's life, we actively contribute to high-quality recycling, which involves a process sequence that produces recyclate of the same quality as material-identical primary raw materials.

II. PRACTICAL IMPLEMENTATION (Examples)

1. Design Process

a) Energy consumption and adhesive material savings



tesla hot melt valves enable a 50% reduction in adhesive usage and associated CO₂ emissions, significantly cutting packaging production costs and ecological impact without premature valve failure due to defects.

Electrically driven adhesive application valves have a service life that is at least five times longer than that of pneumatically driven valves.

One more benefit is that most Baumer hhs adhesive application valves do not need expensive compressed air, which is linked to high energy

consumption and environmental impact. Compressed air-powered products are still necessary for specific applications, but our goal is to offer an electrically driven product with comparable performance for every compressed air-driven product within 5 years at the latest. Through simulations and the use of modern optimization methods, we have already made significant progress in this direction.

b) Material selection



The plastics used in mechanical engineering are different from commodity plastics because they require additives to ensure durability and resistance to high temperatures. Engineering plastics are used in smaller quantities and have mostly unknown compositions, making high-quality recycling difficult or impossible. There is some hope that chemical recycling might be a solution, but its sustainability and economic viability have yet to be proven.

To address this issue, Baumer hhs uses metal for housings, which can be recycled in a high-quality manner. One example of this is our Xmelt melting equipment. Despite the metal housing, the tank is optimized for insulation, resulting in an excellent energy balance.

We are proud to have achieved that, depending on the Xmelt equipment, between 85 and 90 percent by weight can be recycled to a high standard.

c) Waste reduction and cleaning effort

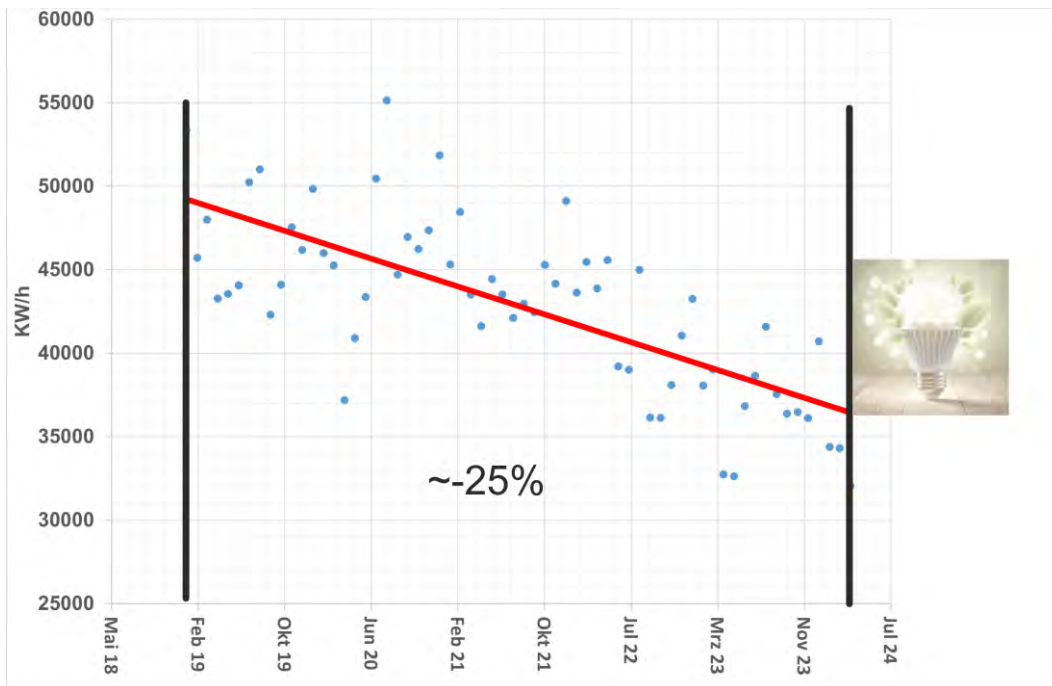
Open Adhesive systems, like glue wheels, that use cold glues have a drawback in that the adhesive often needs to be cleaned due to evaporation and the introduction of contaminants. This results in unproductive time spent on cleaning, as well as the generation of large quantities of wash water that needs to be collected and disposed of properly. On the other hand, closed nozzle application systems do not have issues with evaporation and are robust enough to withstand slight drying at the nozzle tip without affecting restart. This means that the amount of cleaning waste is minimal. Baumer hhs is committed to replacing open application systems with closed nozzle application systems.



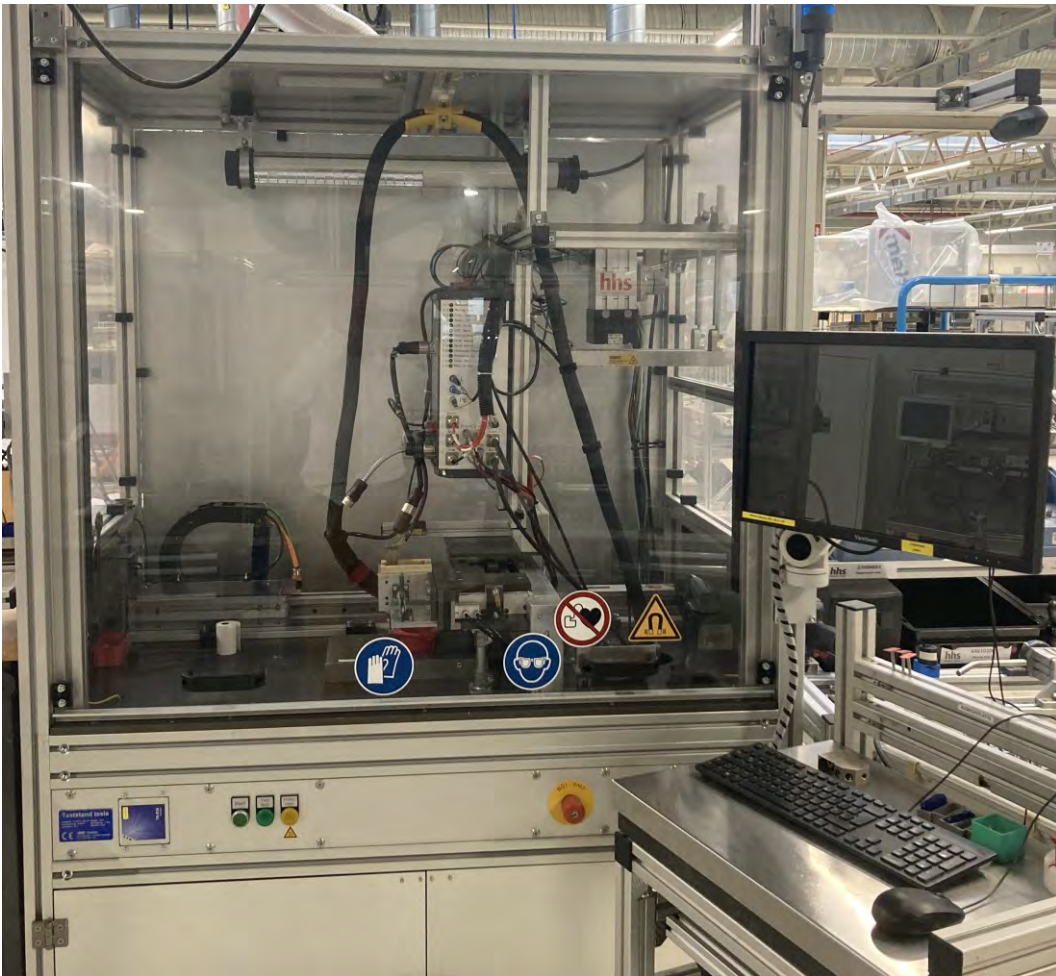
The Baumer hhs Side Seam Gluing Solution is a successful example of implementation. This solution replaces traditional wheel applicators with a nozzle applicator. During development, the main challenge was to ensure that the gluing flap was glued from start to finish. This was achieved through a new control process. The nozzle application solution of the Side Seam Gluing Solution allows for adhesive savings and reduces CO2 emissions associated with adhesive consumption by up to 50%. It also

produces less adhesive mist and enables higher production speeds. The cleaning effort and the waste water are drastically reduced. Overall, the Side Seam Gluing Solution is a more sustainable option compared to a wheel applicator.

2. Realization / Production



We are committed to reducing the CO2 footprint of our production. One example of this is our achievement of a 25% reduction in energy consumption over the last 3.5 years. Our overall energy consumption was already low because Baumer hhs primarily develops and assembles, rather than manufactures, the parts. These parts are supplied by well-established and reliable vendors, many of whom are local.



We have introduced more automated product test benches, helping us detect faults at the earliest stage possible.

3. Operation/Use

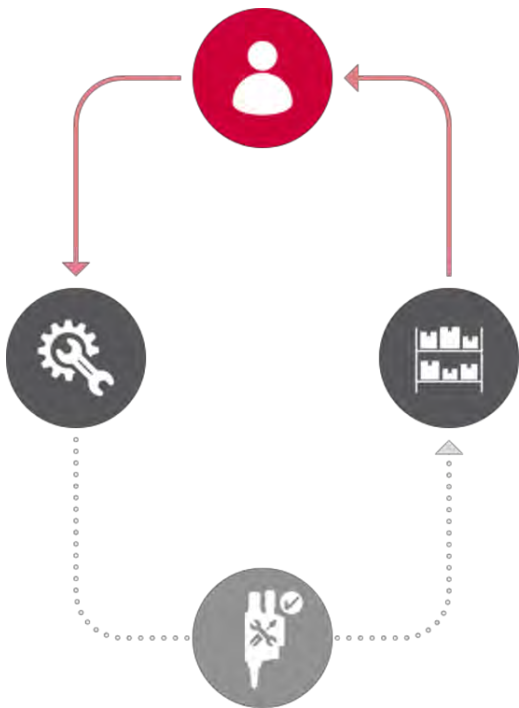
a) Application Quality/Quality Assurance



We are committed to achieving the highest quality in adhesive application. Our goal is to prevent waste by ensuring quality rather than just controlling it. Our PX 1000 adhesive application valve has already shown significant improvement by reducing contamination and gluing errors compared to the previous model, resulting in fewer rejects and resource savings. We are dedicated to continuously improving application quality and extending these improvements to other areas.

The new adhesive monitoring sensor GDX1000 is much more accurate and sensitive than the previous version. It can detect potential errors in adhesive application at the earliest stage, allowing for timely intervention. Additionally, it can easily and reliably monitor areas without adhesive. As a result, any errors in glue application can be detected before the packaging is delivered.

b) Refurbishing/Reconditioning (Exchange program)



In the exchange program, you can trade in a defective product for a completely refurbished one with a new warranty. "Refurbished" means that not only are defective parts replaced, but the entire product is taken apart, cleaned, and then reassembled. This method ensures that the product is as good as new and helps save resources by reusing suitable parts. The exchange program reflects Baumer hhs' commitment to sustainable and circular

management. Many products are already part of the program, and there are plans to expand it to include more products.

Products in the exchange program:

- ULT-300 Glue monitoring sensor
- GDX 1000 Glue monitoring sensor
- LNT-300 Disc glue monitoring sensor
- MLT-40 Multi-track glue monitoring sensor
- ULT-400-XL Glue monitoring sensor XL
- CT-300 Colour code reading head
- SCAN-400
- Xtend³ touch screen 15.6"
- Xtend³ Touch Screen 21.5"
- KPE9-PMDRE6 Adhesive delivery unit
- DPP-8 Adhesive delivery unit
- HM-500-1x2-FC coating head
- Bypass XMG-100

4. Recycling



Every product has a lifespan, and even though we may want to prolong it, it eventually comes to an end. When it comes to high-quality recycling, it's beneficial to break down defective products into their waste categories so that they can be sent for appropriate and optimal processing. We are actively involved in this dismantling process and excel at it because we have a deep understanding of our products compared to recyclers. This approach ensures that valuable resources are returned to the cycle in high quality and helps in reducing the consumption of primary materials.

III. Factory environment



We care about the environment in various ways, even if it doesn't exactly fit in with the ecodesign theme. The areas around our companies are planted with many plants that attract beneficial insects. The loud buzzing and fluttering butterflies are proof of this. We also allow a limited amount of wilderness to support an optimal ecosystem. Employees of Baumer hhs have built a supra-dimensional insect hotel on their own initiative, which is very busy in the summer.

IV. Final Words

These examples provide only a glimpse. We are progressing towards more sustainable business practices and will continue to evolve.

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