



BioVoice Challenge

Waste separation in Holle Bolle Gijs

Design Specification Document

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1 Introduction

Efteling's ambition is to be a climate-neutral company by 2030. One of the biggest contributing factors to the park's carbon footprint is waste, and although many types of waste are already collected behind the scenes, the same cannot be said for the stage. Now that consumers will have to pay a deposit on small PET bottles in the Netherlands in 2021, before moving to include cans as well in 2022, collecting these materials separately has become an interesting prospect.

Facts and Figures

- In the Efteling, glass bottles are served in outdoor seating areas, whereas PET bottles are sold at other dispensing points or self-service restaurants. Cans are sold on a very small scale.
- We assume that at least 50% of visitors will bring food and drink from home to the park, which will also include cans.
- 15% to 20% of all waste collected at the park is made up of PET bottles, with cans accounting for 5%.
- The goal of Coca Cola European Partners is to recycle 100% of PET bottles.
- On an annual basis, approximately 3,000,000 PET bottles and 40,000 cans circulate within De Efteling.

Experience is paramount to De Efteling, which is why we see it as a great challenge to have our most famous bin, Holle Bolle Gijs, separate waste as well. By doing so, we will encourage visitors to separate recyclable waste by offering them a fun experience.

First, a pilot/test will be conducted with one of the members of the Gijs family. It is possible that the waste separator will be rolled out to other family members at a later stage.

1.1 Document description

This document describes the intended functionality and design principles of Holle Bolle Gijs. The decorative elements are beyond the scope of this design specification document (DSD).

Areas in which decisions are yet to be made are highlighted in **yellow**.

1.2 Scope

These design principles relate only to the following:

- Installation;
- Safety;
- Control;
- Maintenance;
- Anything that touches directly on these points.

1.3 Document history

- 01-03-2021 version 1 Final - Issued for the Challenge
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2 Introduction to Holle Bolle Gijs

2.1 world-famous

In 1959, the very first Holle Bolle Gijs made its way into De Efteling in order to solve the park's littering problem. After it was introduced, Holle Bolle Gijs turned out to be so popular that a whole new problem arose: Plants and bushes were stripped bare for lack of waste.

After this initial success, the Holle Bolle Gijs family quickly grew, with new waste collection stations being installed at various locations throughout the park, each with a distinctive appearance. Holle Bolle Gijs is considered a unique feature of De Efteling and the underlying concept has even been copied by several other parks. The Efteling has even sold some of these systems commercially, not as Holle Bolle Gijs, but as customer-specific applications.

2.2 Technology

Efteling's entire Holle Bolle Gijs family (11 members) are based on the same principle. Behind the front end of the system, there is a closed container space, which is pressurised by an exhaustor. This allows air to be sucked in through the system's mouth.

After waste has been thrown into the system, it is transported to a waste container through a tube. As it exits the tube, the waste passes a detection window, after which Gijs politely says "thank you".

Each system consists of two separate spaces: a 'dirty' space for the waste containers and a technical space for the exhaustor and electrical system. Both spaces are also equipped with a fire detection system. The dimensions of these spaces vary from one Gijs to another.

2.3 Operating principles

Below is a list of key operating principles.

- The current waste container is a movable 1100L container made of aluminium.
- The system switches on and off automatically, thanks to a Beckhoff PLC with integrated network connection. The system can also be switched on manually with a manual switch (Manual, off, auto).
- The object's status and all alerts and notifications are communicated on this network,
 - allowing fire alarms, for example, to be sent straight to the control room.
 - 'Nice to have' is to expand the system's communication capabilities.
- There is a light at the rear of the objects, which is used to communicate faults.

3 Introducing the Biovoice Challenge

De Efteling visited all 11 waste collection stations in a search for a suitable location for this waste separation challenge. Since the various stations all differ in size, they are not all suitable for the challenge. In addition to dimensions, De Efteling also considered location, the expected amount of waste to be collected, and the ratio of return packaging in the waste stream.

Ultimately, 5 out of 11 waste collection stations were deemed suitable for the integration of a waste separator. Their dimensions are suitable and they are all located in busy areas with hospitality outlets in their immediate vicinity.

3.1 Geeuwende Gijs

In the end, De Efteling opted to issue a challenge for the 'Geeuwende Gijs' location, which is situated in the Marerijk section of the park along a major walking route. This waste collection station is enveloped by a large restaurant with a lot of outdoor seating and has various hospitality outlets in its immediate vicinity. On top of that, visitors often take pictures with Holle Bolle Gijs here, even though it is not the 'original' one. The container space is in the restaurant's back of house, which means waste processing will not be an issue.

3.2 Photos of Geeuwende Gijs



Image: Geeuwende Gijs. The familiar front view



Image: Rear of Geeuwende Gijs and container staging area.



Images: (left) Technical space (right) dirty, container space.

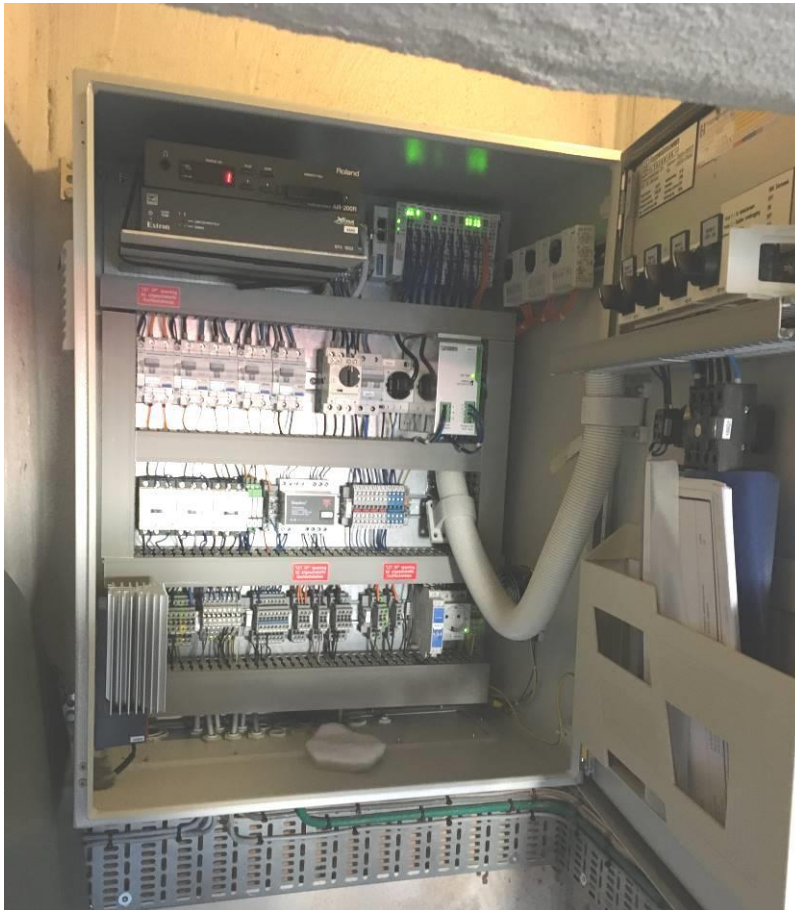


Image: Electrical system



Image: Light showing object status (operational, faults)

4 System principles

The design principles for the prospective system are listed below. Nice to haves are indicated as such. All other principles are considered must-haves.

4.1 General information

Method as follows. Progress will be reviewed when progressing from one phase to the next.

- Phase 1: Present draft design and notes
- Phase 2: Present preliminary design and notes
- Phase 3 Present final design and design details.
- Phase 4: Implementation
- Phase 5: Completion & Aftercare.

4.2 Waste

- Continuous intake of waste should be maintained (no intervals or blockage);
- Takes into account a high degree of pollution (e.g. sauces, ice and liquids);
- Size of waste varies. Odd-sized waste such as umbrellas and ponchos is common.
- The collected waste must be stored in separate containers/bins.
 - Submit offer to design the system.
 - Manage all waste within the system's current dimensions.
 - The ability to separate at least:
 - Returnable packaging:
 - PET - 240L container (with PET return bag).
 - CANS – limited quantities, container sizes tbd
 - Residual waste
 - (nice to have): separate non-deposit PMD from residual waste
 - Non-deposit PMD - 240L container
 - Residual waste - (nice to have) preferably in 1100L container.
- Containers should be easily and quickly interchangeable. Particularly popular bins will have to be swapped in and out easily while the park is open.
 - If this requires structural interventions, please specify them in the proposal.

4.3 Engineering & aesthetics

The existing space is shown on drawing: HBG-WIP-060-050-TCHW-A001

- PDF drawing - attachment
- STEP File - attachment
- Solid Works 2020 file available on request.
- IFC file available on request.
- The technical solution should be applied to an existing Holle Bolle Gijs;
 - No large-scale structural modifications;
 - The front end should be retained;
 - The underlying technology must not be visible to the visitor;
 - No visible advertising or logos;
- The solution should fit within the existing technical space behind the object;
 - The 5 Holle Bolle Gijs objects eligible for this solution each have different dimensions. In order for the prospective solution to be used more broadly, consideration must be given to:

- Modular construction of the machine: shifting and rearranging the components should allow the system to fit in a different Holle Bolle Gijs object.
- Maximum dimensions of the solution including waste storage (universally applicable):
 - Height: 1.40m;
 - Width: 1.40m;
 - Depth: 2.40;

4.4 Technical aspects

- The technology used should be reliable and low maintenance;
 - Operating hours : 16 hours a day, 365 days a year;
 - The space is not conditioned.
 - Takes into account a high degree of pollution (e.g. sauces, ice and liquids);
 - The contractor shall provide documentation to and organise training for De Efteling to facilitate 1st-line maintenance and fault handling.
 - The system shall be serviced by the contractor on an annual basis. A service contract will have to be proposed at the end of the 2nd phase.
 - Maintenance must be performed outside the park's opening hours. The object must be operational during the park's opening hours. Exceptions are possible in consultation.
- Holle Bolle Gijs must be able collect waste at all times, even if the underlying separator is (temporarily) out of service. In that situation, all waste is classified as residual waste.
- Only the waste separator falls within the scope of this project.
 - Efteling will integrate the waste separator into the Efteling's control systems, using our main installer Hoppenbrouwers. Contractor will provide a list of all I/O.
- Equipment and components should be easy to clean;
 - Stainless steel or plastic parts are preferred;
 - Parts used in dirty zone should preferably be IP-56 rated;
 - Resistant to water and non-corrosive cleaning agents;
- Fire
 - The existing fire alarm system will remain in place and must communicate fire alarms in the same way as is currently the case.
 - Fire alarms in the waste containers are a common occurrence, often due to smouldering materials that can be extinguished with foam extinguishers or powder extinguishers. The contractor must advise on the use of extinguishing agents. The parts used should be compatible with foam extinguishers.
- Equipment and parts should be easily accessible and replaceable;
- Waste recognition
 - (to be determined in consultation with the design department). To thank visitors for throwing away their 'returnable waste', we may consider adapting the 'thank-you message' played by Holle Bolle Gijs. This will be coordinated internally by De Efteling. To make this possible,
 - (nice to have) the system must be able to recognise waste types (return packaging/PMD).
 - the system could feature free inputs to allow De Efteling to play an 'adapted' thank-you message.

- Standardisation in accordance with Efteling standards:
 - Additional Requirements for Electrical Systems Efteling V4.00.
 - Compressed air parts: Festo.
- Fill monitoring and faults
Because this challenge involves separating waste in a confined space, we expect that emptying the bins in time may become an issue. As such, it is important that the systems be able to communicate bin fill levels and faults. On-duty facilities staff and/or restaurant staff must be able to solve the issue on site.
 - The system could potentially feature free inputs to allow Efteling to process status and fault notifications via its network.
 - The warning light and all other instruments must be retained (no sounds other than the fire alarm).
- (nice to have) Counter to count the number of items of return packaging collected. Efteling employees must be able to reset this counter.

4.5 FAT / SAT test

Factory acceptance test / side acceptance test.

- The contractor will arrange a presentation of the working system to De Efteling. De Efteling will provide waste that is representative of the waste that the system must be able to process.
- If the system is able to process this waste in the Factory Acceptance Test, it can be transferred to De Efteling.
- After the system has been installed and integrated with De Efteling's control system, a SAT will take place. On top of waste processing capabilities, control and communication systems will also be tested.

4.6 Documentation

The contractor must provide:

- Wiring diagrams in E-plan;
- Mechanical diagrams in PDF;
 - Assembly drawings for maintenance purposes.
 - Drawing with part list.
 - Maintenance information, e.g. tightening torques, lubricating grease.
- User and maintenance manual containing:
 - General Description;
 - Recommended spare parts;
 - Maintenance interval in (daily, weekly, monthly, quarterly, yearly)
 - Part replacement intervals.
 - Product data sheets of all purchased components;
- Proposed service contract;
- Risk Inventory and Evaluation;

5 Safety

Separation techniques must comply with at least the following directives, taking product liability into account when developing new products.

- Machinery Directive 2006/42/EC;
- Low Voltage Directive NEN1010;

6 Attachments

1. Drawing: HBK-WIP-060-050-TCHW-A001
2. STEP file: HBK-WIP-060-050-TCHW-A001
3. Additional Requirements for Electrical Systems Efteling V4.00.
4. Efteling drawing guidelines