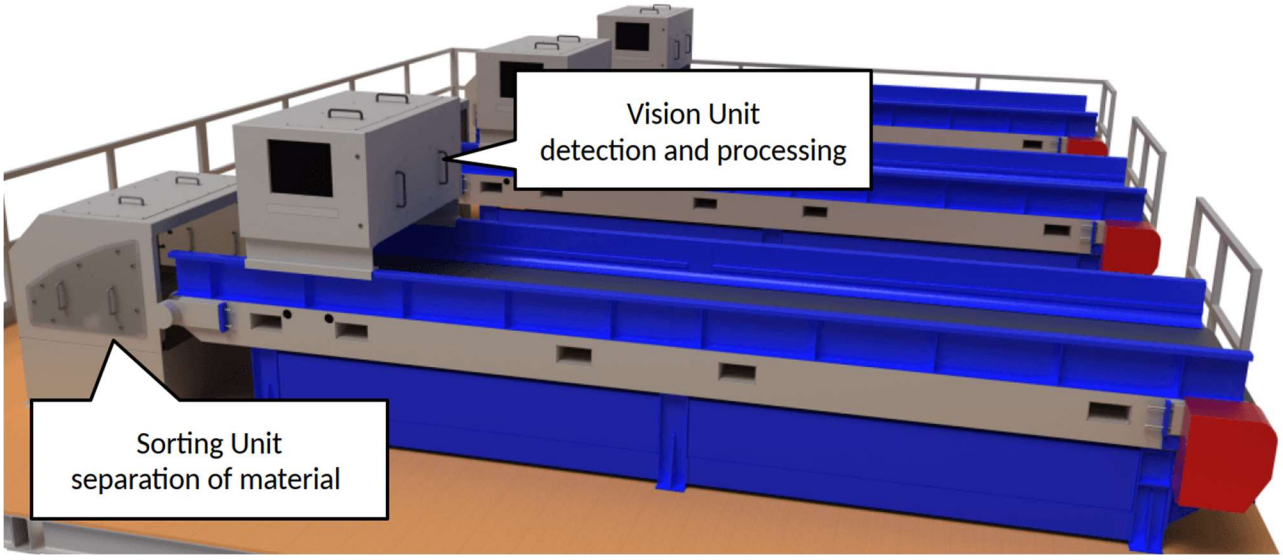
UCY SCALABLE SORTING PLATFORM

Technical Overview

ucy technologies

UCY Scalable Sorting Platform - Overview



Components and Working Principle

The UCY Scalable Sorting Platform is a comprehensive solution for optical sorting of plastic waste and bottles. Entirely in-house developed, software-defined technology and a high degree of modularity allow for flexible integration in new and existing plants and cater to the most diverse needs of integrators as well as end customers.

VISION UNIT

The technological heart of the machine. Containing all the optics, sensors, power supply and processing electronics, it is a compact and innovative powerhouse. Its design adheres to a strictly software-driven philosophy, meaning that all the processing is independent of any custom electronics or specific hardware manufacturers. Using off-the-shelf, interchangeable electronics makes it possible to react quickly to new developments, changing requirements and hardware availability issues.

SORTING UNIT

The place where actual sorting happens, using pneumatics to separate the objects. With either two or three separate chutes, the Sorting Unit can be designed and manufactured independently by the integrator depending on a specific project's needs. UCY Technologies supplies the pneumatic valve units in different widths (typically 1050, 1400, 2000 or 2800 mm) and equipped with high quality valves and a state-of-the-art, Ethernet-based bus system which can be plugged right in to the Vision Unit. After the integration of the valve units, the case design is flexible and can be adjusted freely to the customer's requirements and the integrator's branding.

INDUCTIVE SENSING UNIT

As a separate option, UCY Technologies can supply an array of inductive sensors, intended to be mounted right below the conveyor belt. It shares the signature UCY design philosophy – standardized, modular parts and one simple Ethernet-based connection to the Vision Unit. Leveraging the inductive sensing capabilities in conjunction with the RGB camera data, ferrous as well as non-ferrous metal contaminations can be reliably detected and removed from the material stream.

VISION OS™

Software is what makes all modern technology tick, and it is where you can make all the difference between a good-enough product and an excellent one. This is why UCY Technologies developed its sorting technology platform from a software-defined perspective from the beginning. The UCY Vision OS™ is a hard real-time capable, PC-based platform providing hardware abstraction layers (HALs) for all the input and output hardware. Therefore, changing suppliers of any piece of hardware across the platform is a simple matter of "plug and play". It also enables the synchronization of all input data streams in one processing application which we call the Sorter Master Control Program (SorterMCP). While competitors have to rely on single pixels for making decisions and calculating ejections, the UCY SorterMCP can take into account the entire object and can even account for

unfortunate-but-inevitable conditions like having physically different overlapping objects in the same place on the conveyor belt. Also, SorterMCP can detect black objects purely software-based out-of-the-box without any additional sensor technology. This is made possible by doing intelligent continuous calibration to the background belt and then looking for changes in the camera picture in comparison to previous belt roundtrips, which is another UCY-exclusive innovation.

QUANTSPEC™ TECHNOLOGY

Distinction of different types of plastic such as PET, PVC, HDPE and many others has always been a key challenge in recycling. Hyperspectral imaging is a way to solve this challenge, and this is where UCY's QuantSpec™ technology shines. While competitors buy their hyperspectral analysis software from third-party vendors or have to rely on crude legacy technologies like single-wavelength photosensors and rotating mirrors, UCY Technologies uses its own unique, in-house developed and Machine Learning-based QuantSpec™ algorithm for classification of hyperspectral data. Not only does this make it possible to create entirely custom analysis profiles for the specific distinctions a particular customer is most interested in, but it also allows effortless upgrades to the spectrograph and sensing hardware at the very moment when new developments enter the market. The capability of always using state-of-the-art technology that way is unheard of elsewhere in the industry.

QUANTCLOUD™ AI TECHNOLOGY

New challenges such as the distinction of material origin (food/non-food) by subtle cues such as shape and texture of an object as well as the potential for substantial cost savings through enhanced object detection call for innovative new technologies. UCY's cloud-connected AI QuantCloud™ will bring true intelligence to sorting. Starting in 2022, every Vision Unit ships with preparation for connection to the QuantCloud™ services.[1]

[1] QuantCloud™ services are subject to separate billing.

Technical Data

AVAILABLE MODELS AND NOMENCLATURE

- Widths of 1050, 1400, 2100 or 2800 mm
- Base models with either color detection only (“C” models) or with color as well as NIR detection (“CN” models)

OPTIONS

- Inductive Metal Sensing Unit
- QuantCloud™-powered AI-based enhanced object detection
- Multi-Lane (different sorting profiles across the width of the conveyor belt)
- 4G/5G modem for standalone remote access

ELECTRICAL POWER SUPPLY

SYSTEM WIDTH [MM]	1050	1400	2100	2800
POWER INPUT	3-phase 400 V, 4A, 50 Hz	3-phase 400 V, 10A, 50 Hz	3-phase 400 V, 16A, 50 Hz	3-phase 400 V, 18A, 50 Hz

COMPRESSED AIR SUPPLY

- In accordance with ISO8573-1:2010 classes of at least [7:4:4], lubricated operation is possible
- Operating pressure typically 4 – 8 bar (depending on use case as well as integrator’s Sorting Unit design)

INTERFACES / PLC STATE SIGNALING

- Internet connection is optional and recommended
    - Obligatory for remote support via VPN as well as most QuantCloud™ features
    - Connection either via Ethernet to customer's network or alternatively via a built-in 4G/5G modem (extra fees may apply in the latter case)
- Options for signaling of machine state to PLC
    - Two output bits (SORTING ACTIVE and ERROR) and one input bit (ENABLE SORTING) connected directly via simple wires
    - EtherCAT
    - Modbus TCP/IP
    - Integration of other fieldbus systems such as PROFINET and signaling of custom information is possible

COOLING AND ENVIRONMENT CONDITIONS

- Connection to a liquid cooling system should be provided by customer
- Input cooling water temperature: 18 – 25 ° C
- Operating temperature: +5 … +40 ° C
- Relative humidity: 5 % - 95 % (non-condensing)