

iNNOVATION

don't compromise
on quality

Approved for external communication
Gabriel-Chemie Marketing



INTELLIGENT
MASTERBATCH FOR
SUPERB PRODUCTS.



Introduction

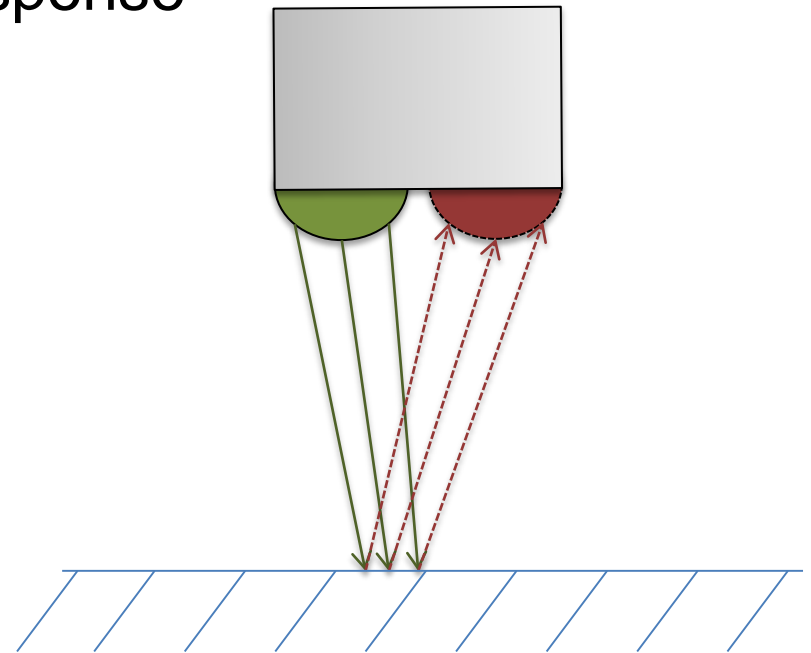
Version 17.10.2019

**What if plastic
could talk?**



Basic Principle

- The polymer is equipped with a „fingerprint“
- The „fingerprint“ is added via taggant particles in the masterbatch
- An LED illuminates the particles
- The sensor then reads the response



What are Taggants?

Definition von taggant

Englisch: taggant

taggant in British
(ˈtæɡənt)

Substantiv

1. electronics

a microscopic material added to a substance to enable it to be tracked by radio frequency

2. chemistry

a chemical marker used in various kinds of testing

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Taggant Technology

TAGgant + TEChnology = TagTec



 **TAGTEC**

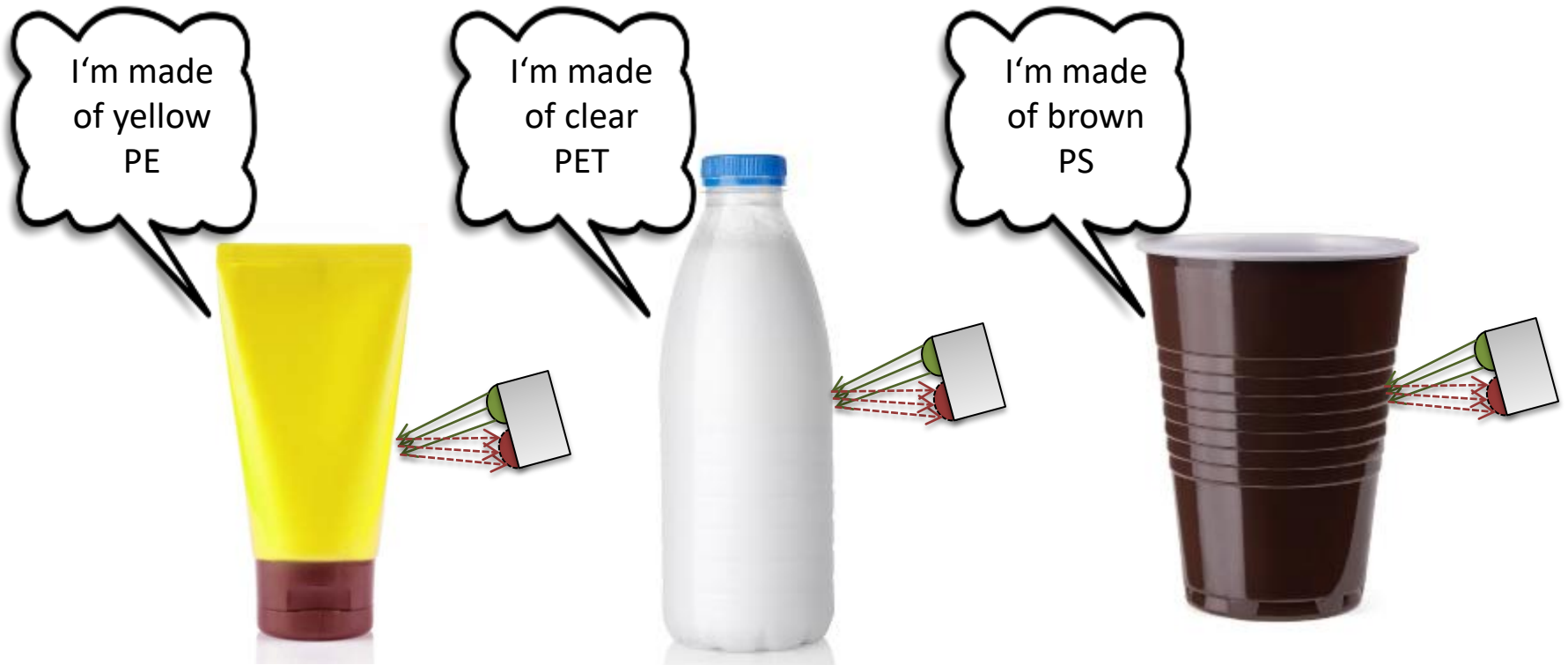


Function

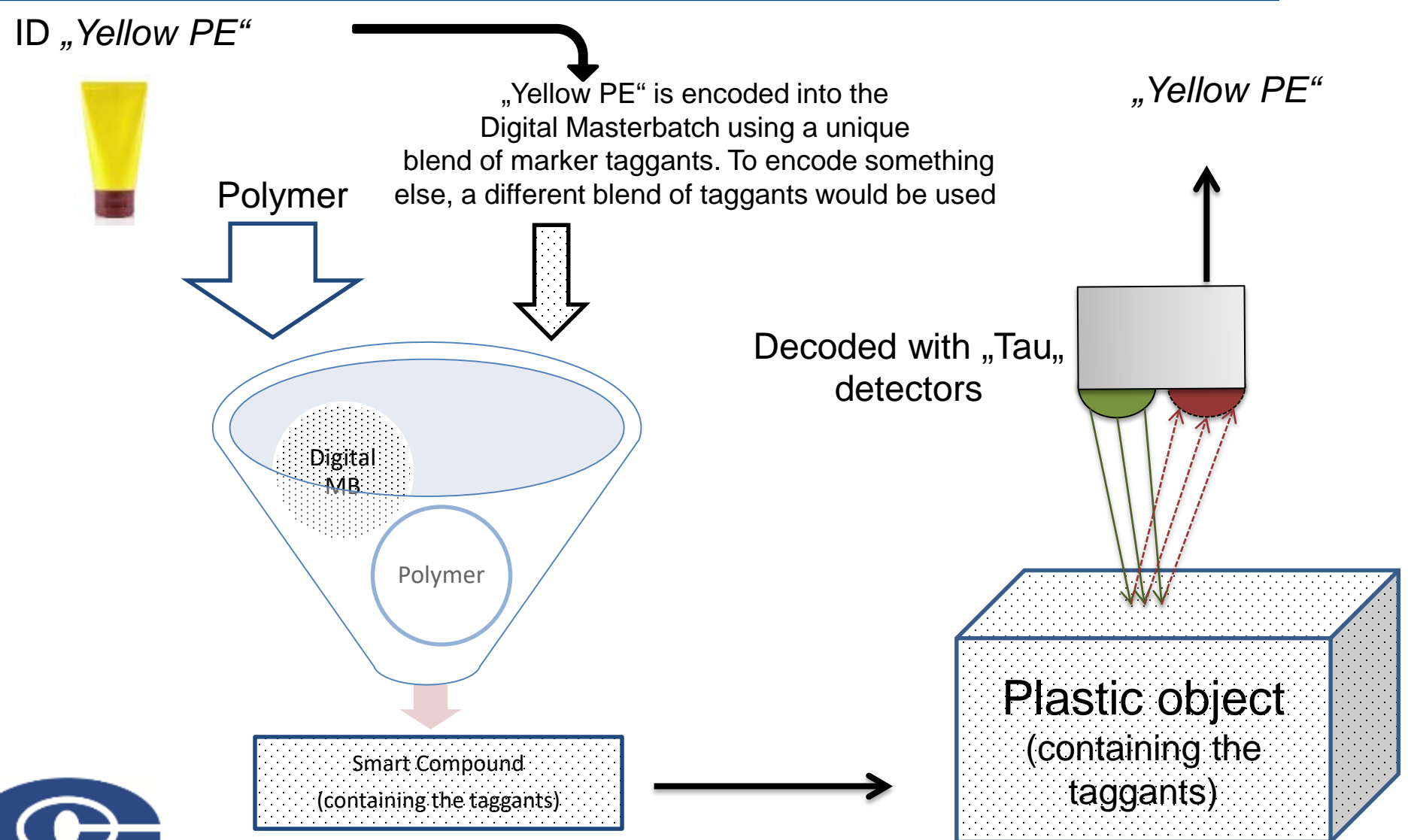


Function 1 –Material Identification

- What are you made of ?



Function1: How It Works



Function 1 – Material Identification

- This functionality works on granules, profiles, containers and also on undefined shapes
- All of the products made with the „intelligent polymer“ give the same answer (i.e. thousands of products can give exactly the same signal)
- The response signal is dependent on the „intelligent compound „ used. Any part of the object can be tested and all parts will give the same signal (e.g. top, bottom, sides).
- Possible applications:
 - Dosage control (e.g. how much UV masterbatch is dosed?)
 - Process control (e.g. material flow rate)
 - Function control (wall/layer thickness, stretching/wear control)
 - Material control (correct raw materials, co-ordinating material use on multiple production sites)
 - Recycling material separation
 - Simple Anti-Counterfeit (is that my film or not?)



Function 2: Individual Part Identification

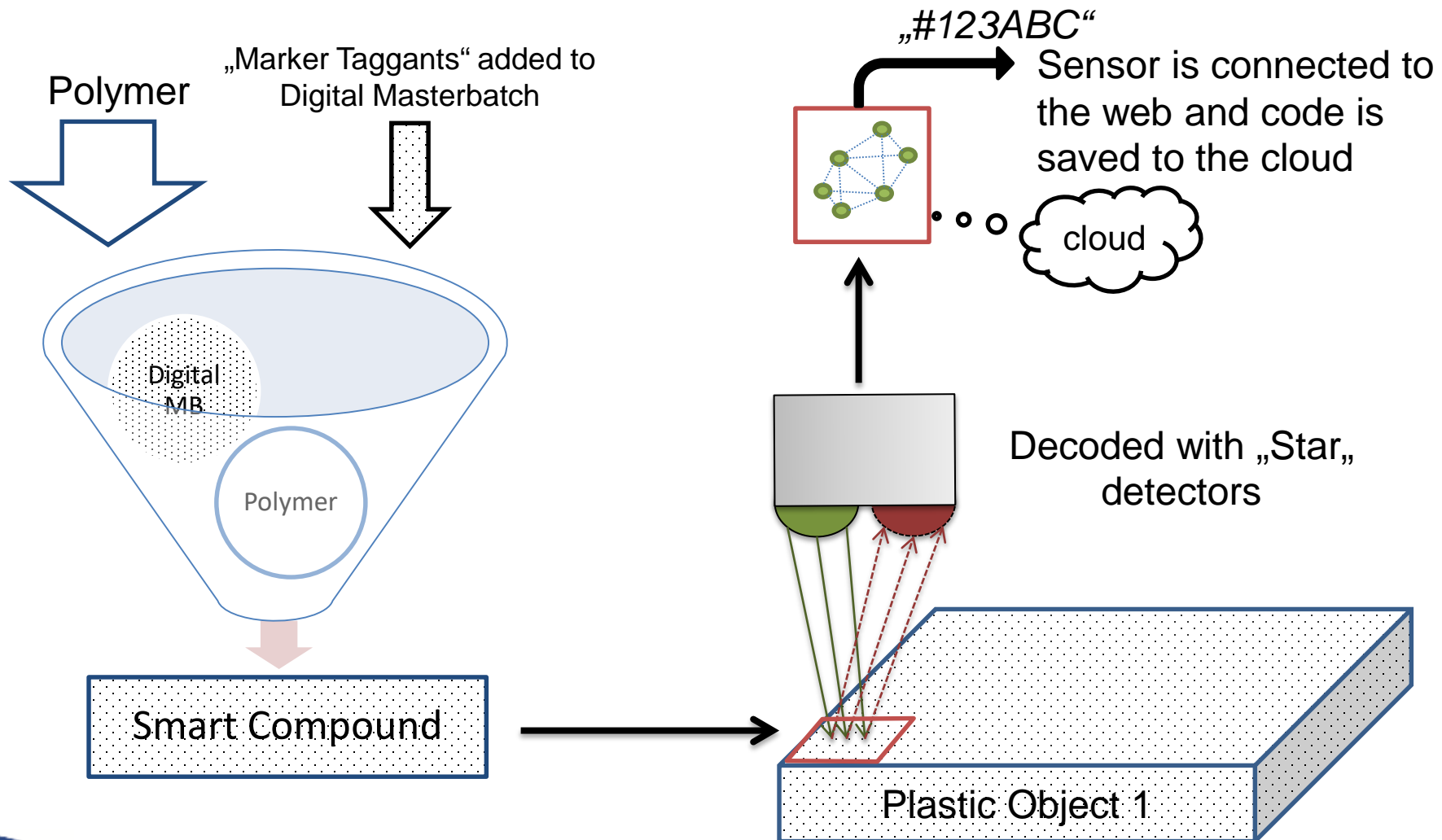
- Every individual part has a unique ID
- A „reference area“ is a defined surface area on the part
- The reference area has to be the same for both encoding and decoding



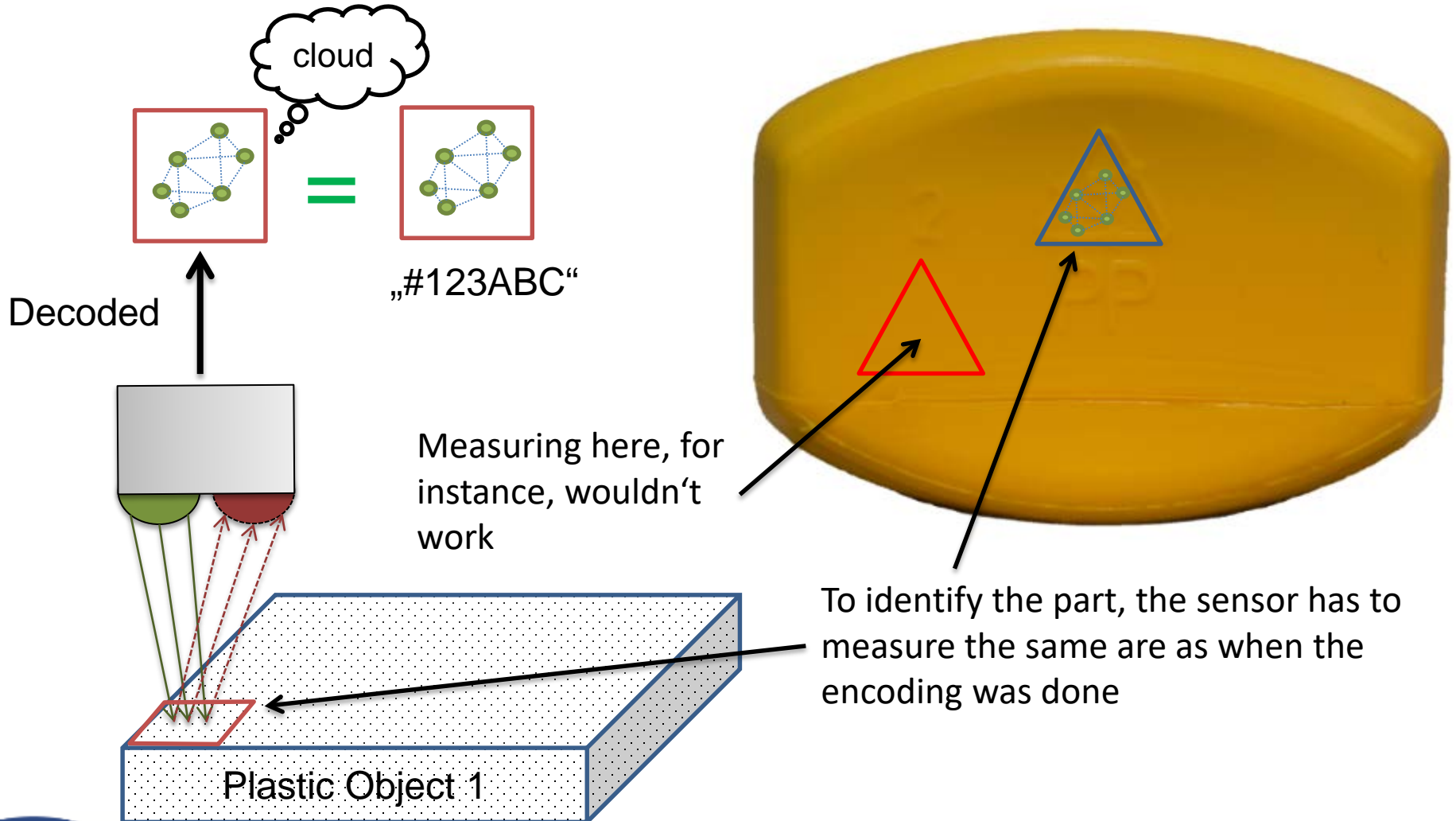
Reference area could be e.g. the recycling symbol



Function 2: Part ID - Encoding

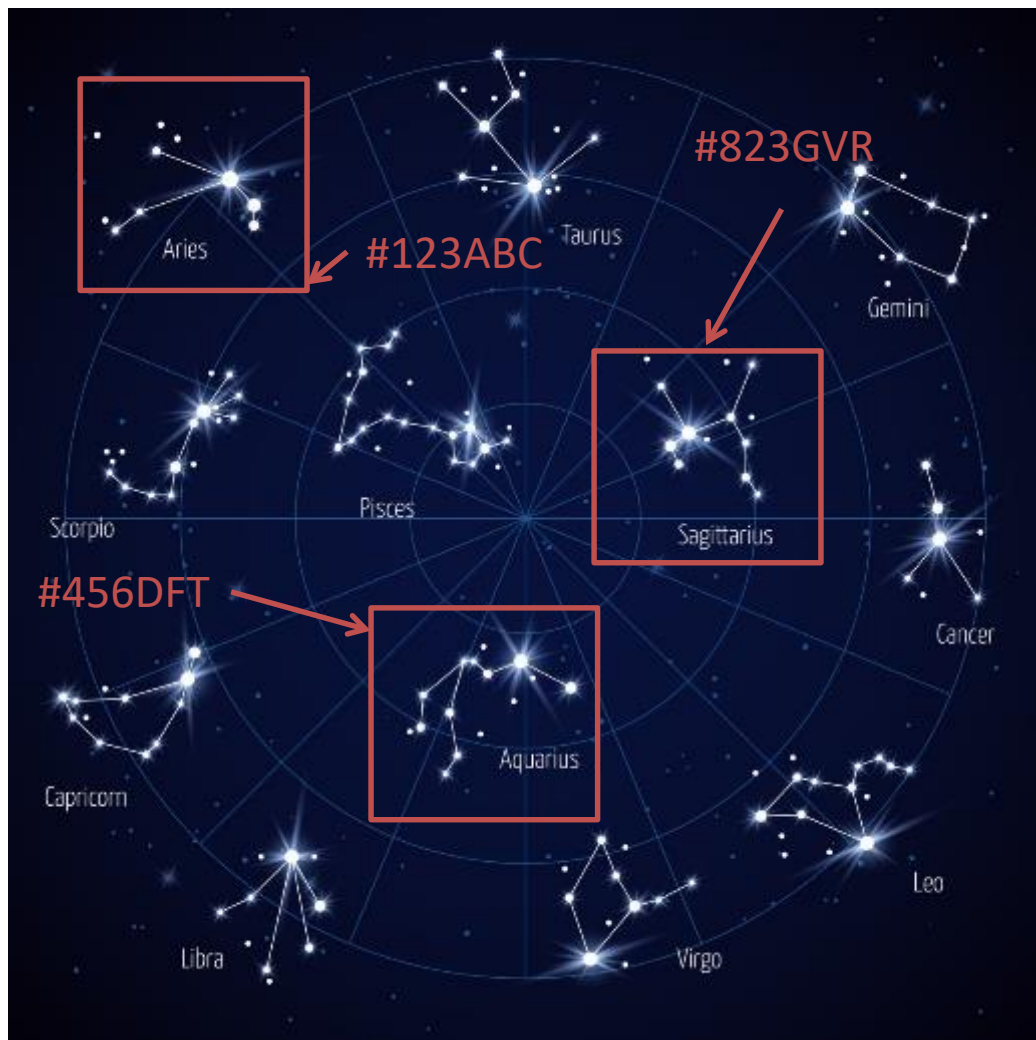


Function 2: Part ID - Decoding

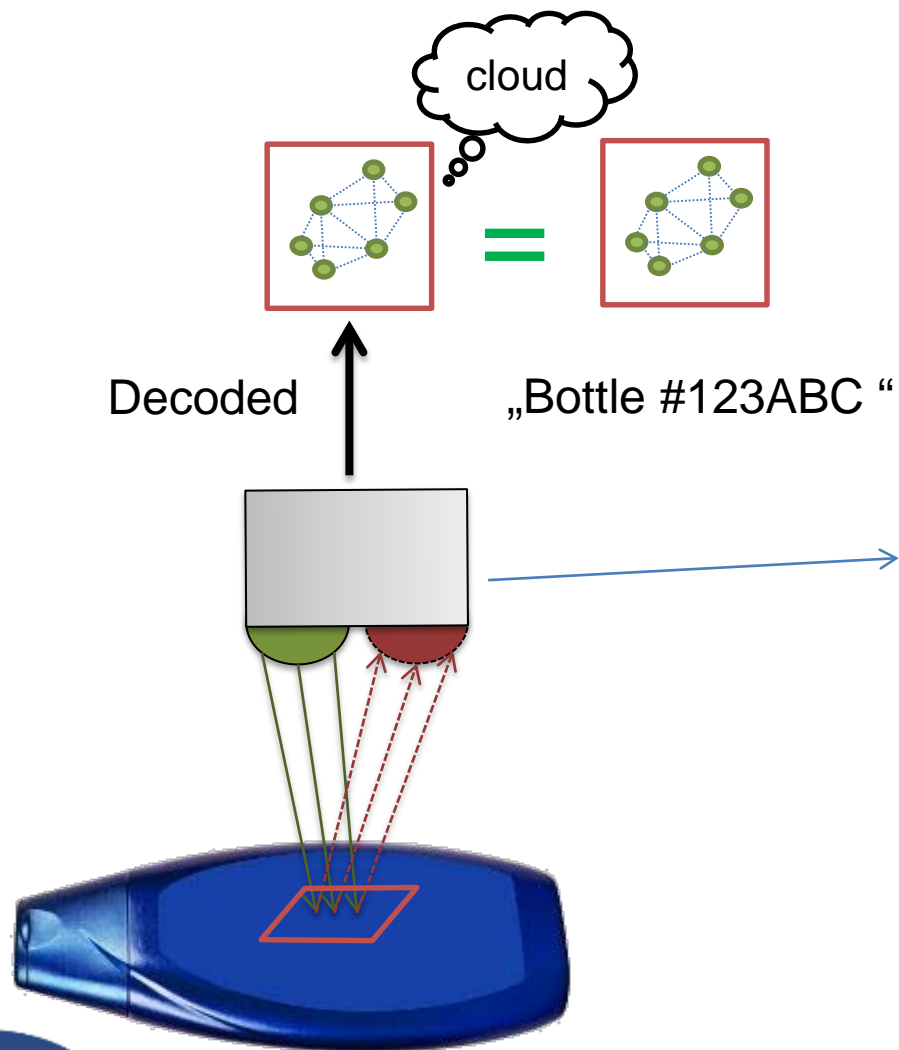


Function 2: Individual Part Identification

- The technology is similar to looking at the night sky
- The stars (marker pigments) are randomly distributed
- By looking in a specific location a unique pattern can be detected and named (encoded) e.g. Aquarius
- Looking in the same location at a later date, the pattern can be recognized again (decoded) e.g. Aquarius



Function 2: Individual Part Identification



- A real world example using the available smartphone sensor



The visible green spots are „illuminated“ marker particles





The Technology



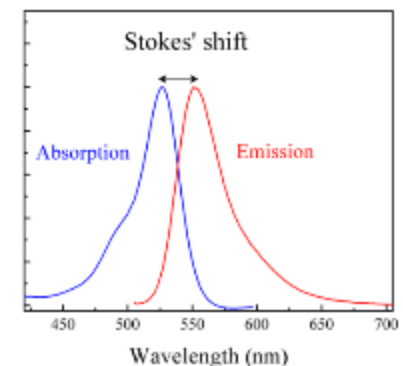
The System

- The masterbatch is provided by Gabriel-Chemie
 - Custom masterbatch can be produced for the customer
 - A separate TagTec masterbatch is possible
 - A combination of functional masterbatch (e.g. additive or colour) and TagTec masterbatch is also possible
 - The masterbatch is sold by Gabriel-Chemie directly to the customer
- The sensors are provided by [Sensor Instruments](#)
 - The sensors are selected and if necessary customized by Sensor Instruments
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 - The sensors are optimised to work with the Gabriel-Chemie masterbatch

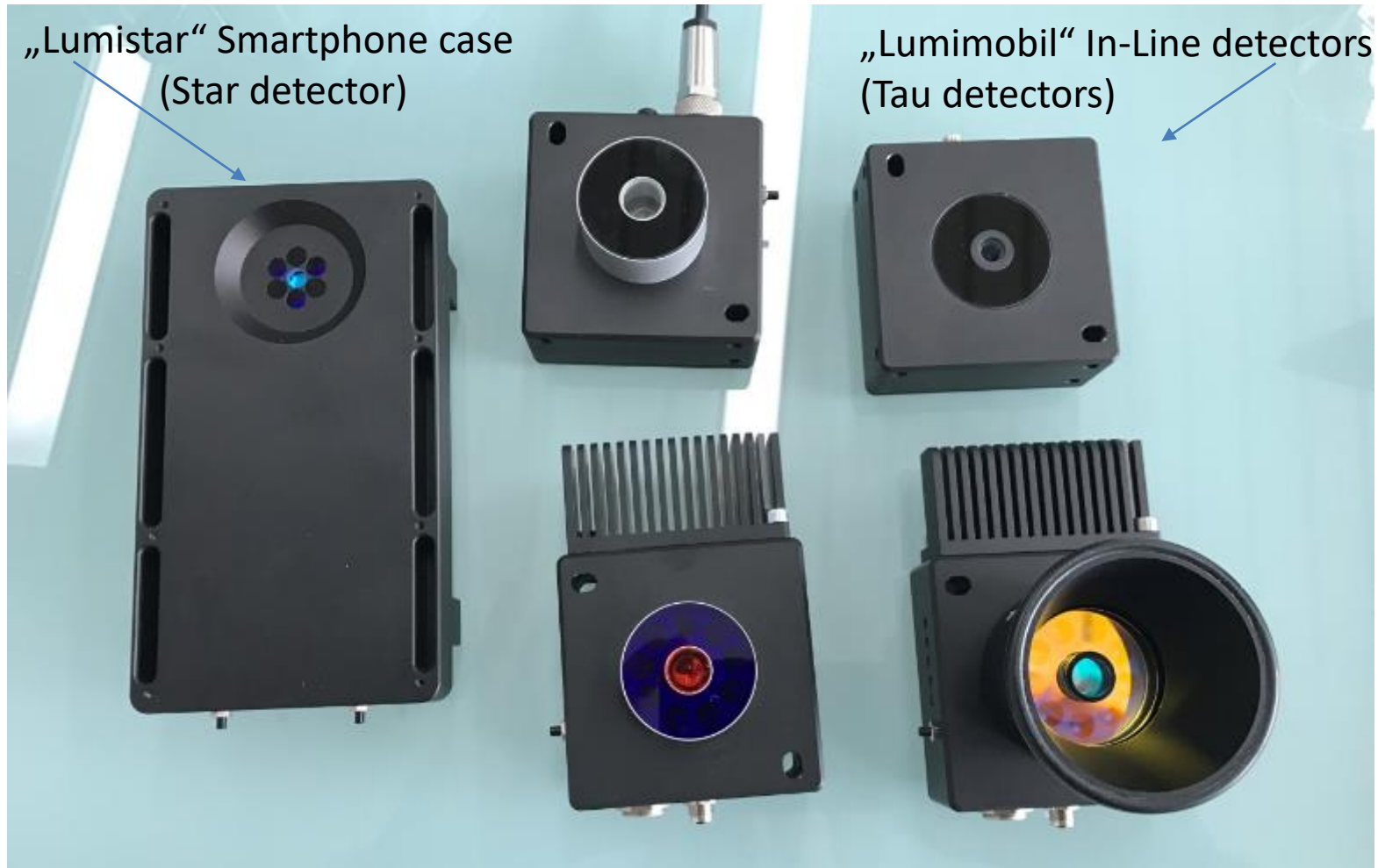


Taggants

- The taggants use an effect from physics called the Stokes shift/anti-stokes shift
- Light is absorbed and then emitted by the taggants and is measured by the sensor
- The taggants are long lasting and are not destroyed by the temperatures used in plastics processing
- The taggants are supplied by European suppliers, who source them globally
- EU food contact approval is ongoing and we assume it will be completed in Q4 2019



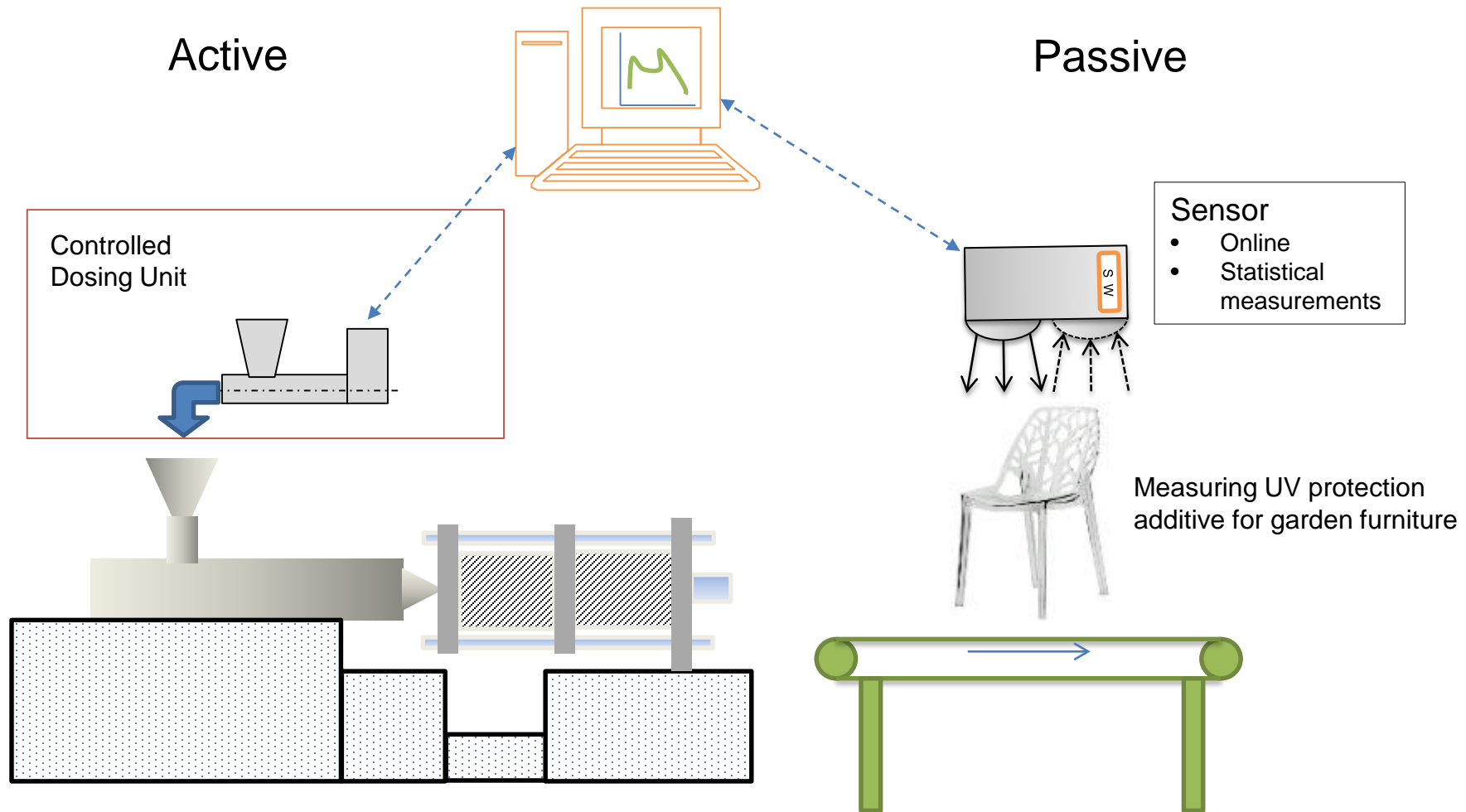
Numerous Detectors Available



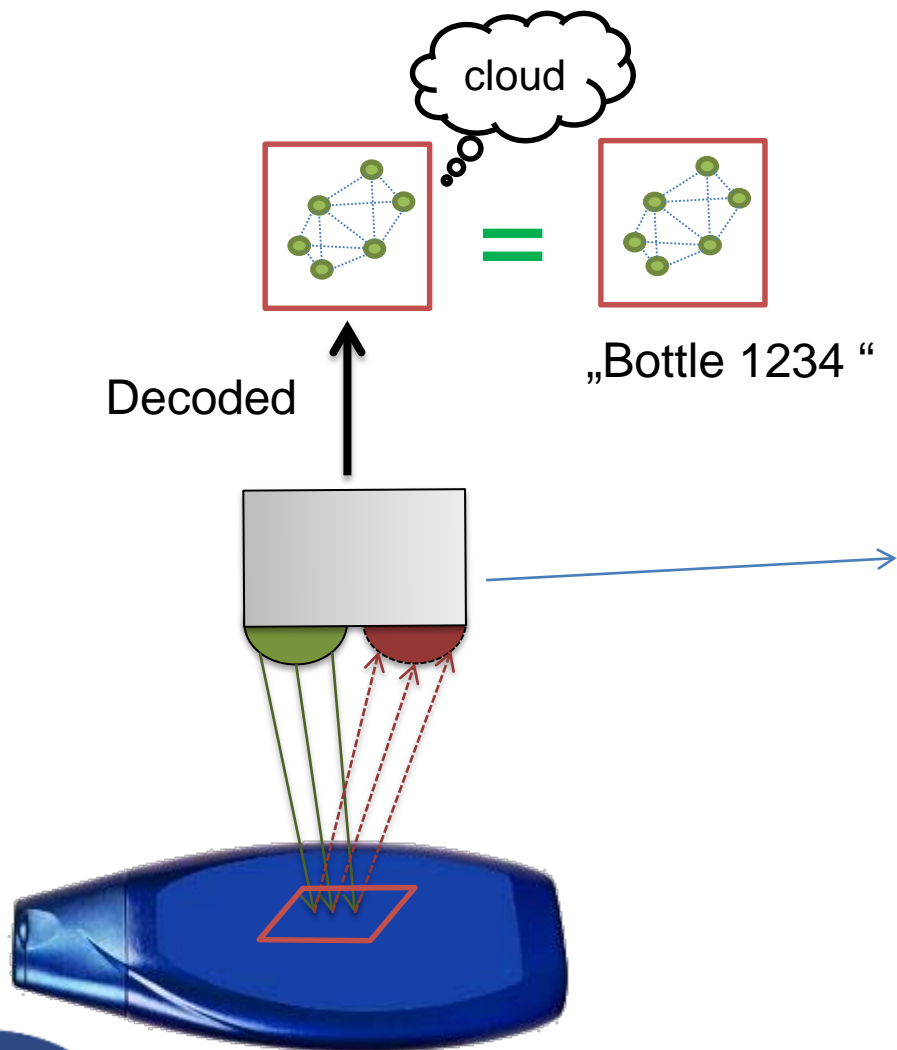
Application Examples



Dosage Control for Injection Moulding



Original Product Verification



Process Control for Films

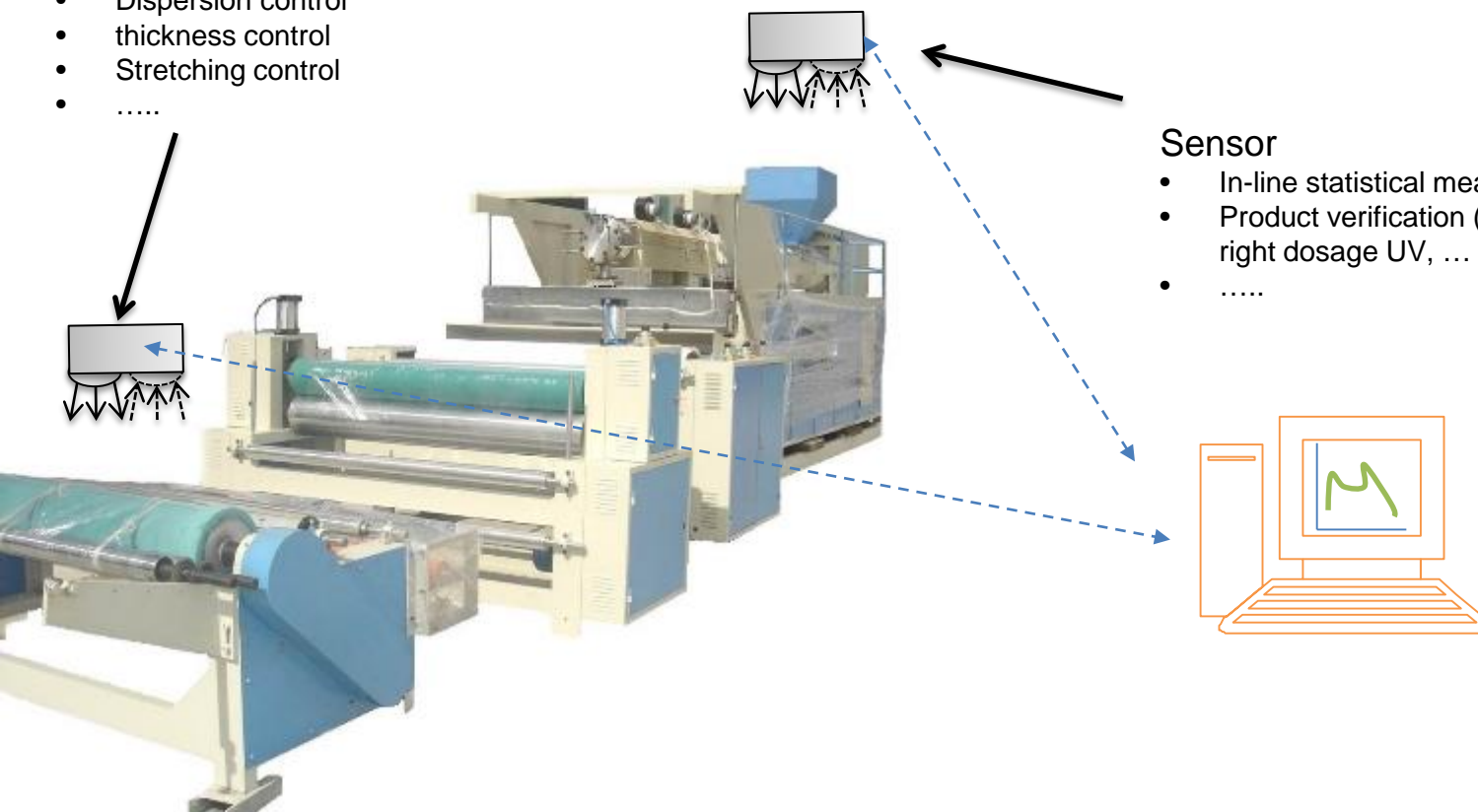
Sensor

- In-line statistical measurements
- Dosage control (additives, colours)
- Dispersion control
- thickness control
- Stretching control
-

Production process monitors many quality relevant aspects

Sensor

- In-line statistical measurements
- Product verification (e.g. right material, right dosage UV, ... or colour MB)
-



Next Steps

- If you identify an application where TagTec could be useful, please contact your local Gabriel-Chemie sales representative for further information.
- If in doubt please send a mail to:

tagtec@gabriel-chemie.com





TAGTEC



GABRIEL-CHEMIE
G R O U P

BRINGING LIFE  TO PLASTICS



Introduction

Version 17.10.2019



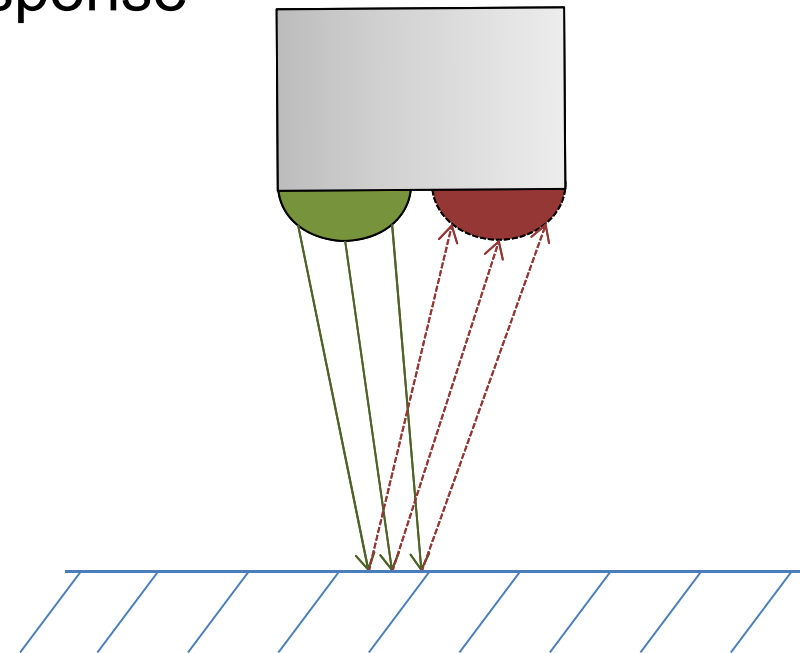
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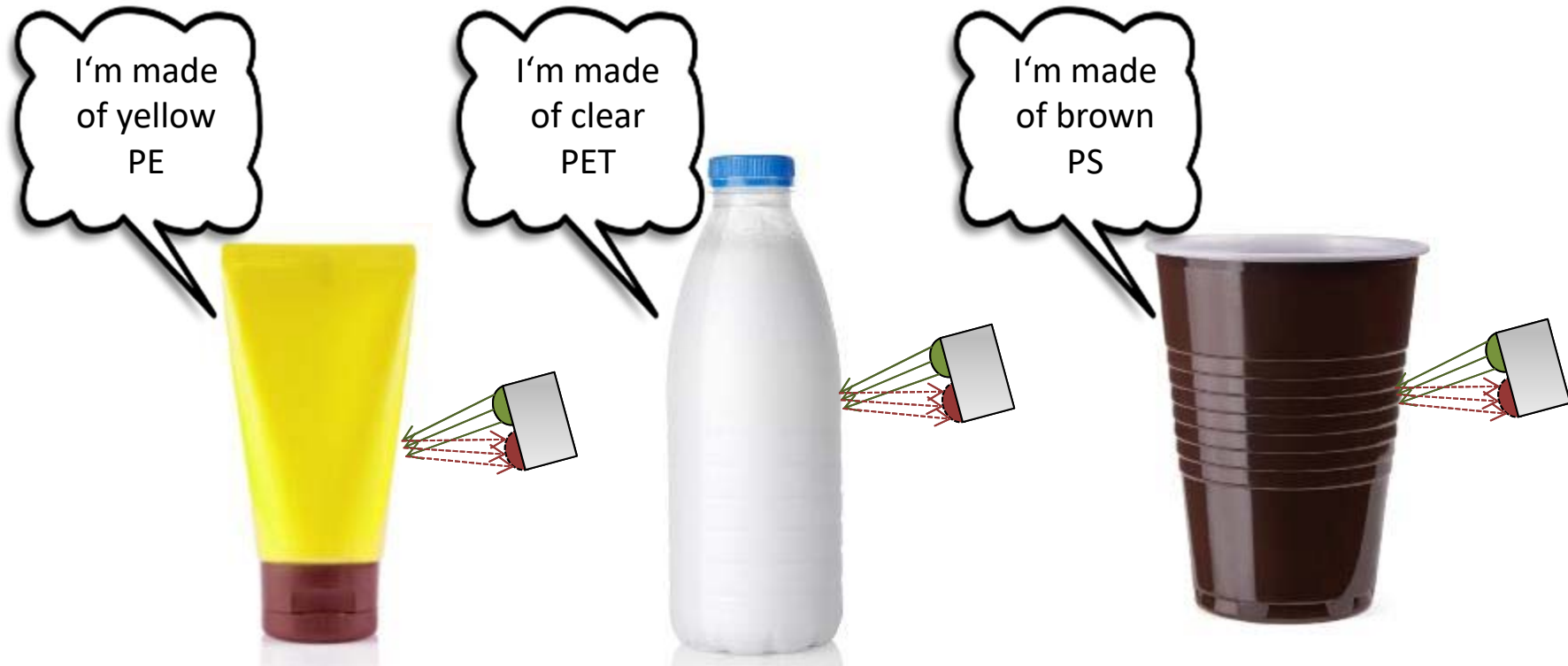
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Function



Function 1 –Material Identification

- What are you made of ?



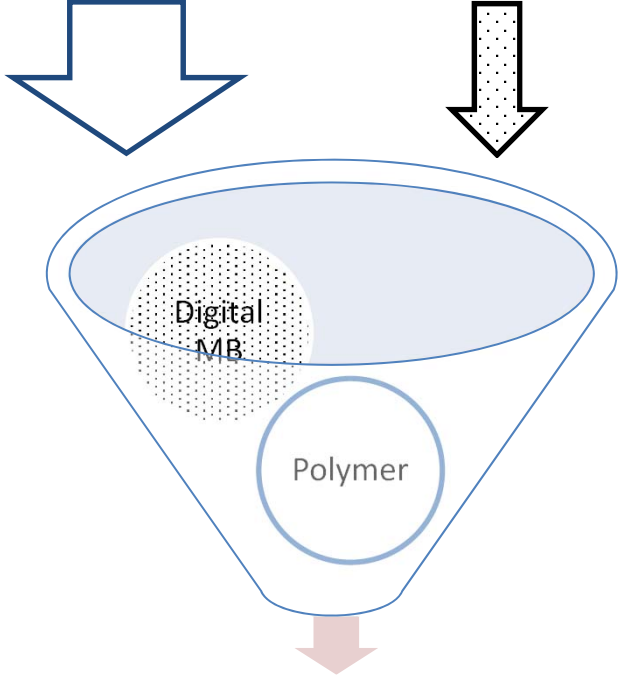
Function1: How It Works

ID „Yellow PE“



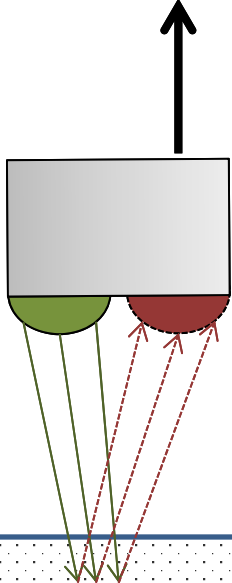
Polymer

„Yellow PE“ is encoded into the Digital Masterbatch using a unique blend of marker taggants. To encode something else, a different blend of taggants would be used



Smart Compound
(containing the taggants)

Decoded with „Tau„ detectors



„Yellow PE“

Plastic object
(containing the taggants)



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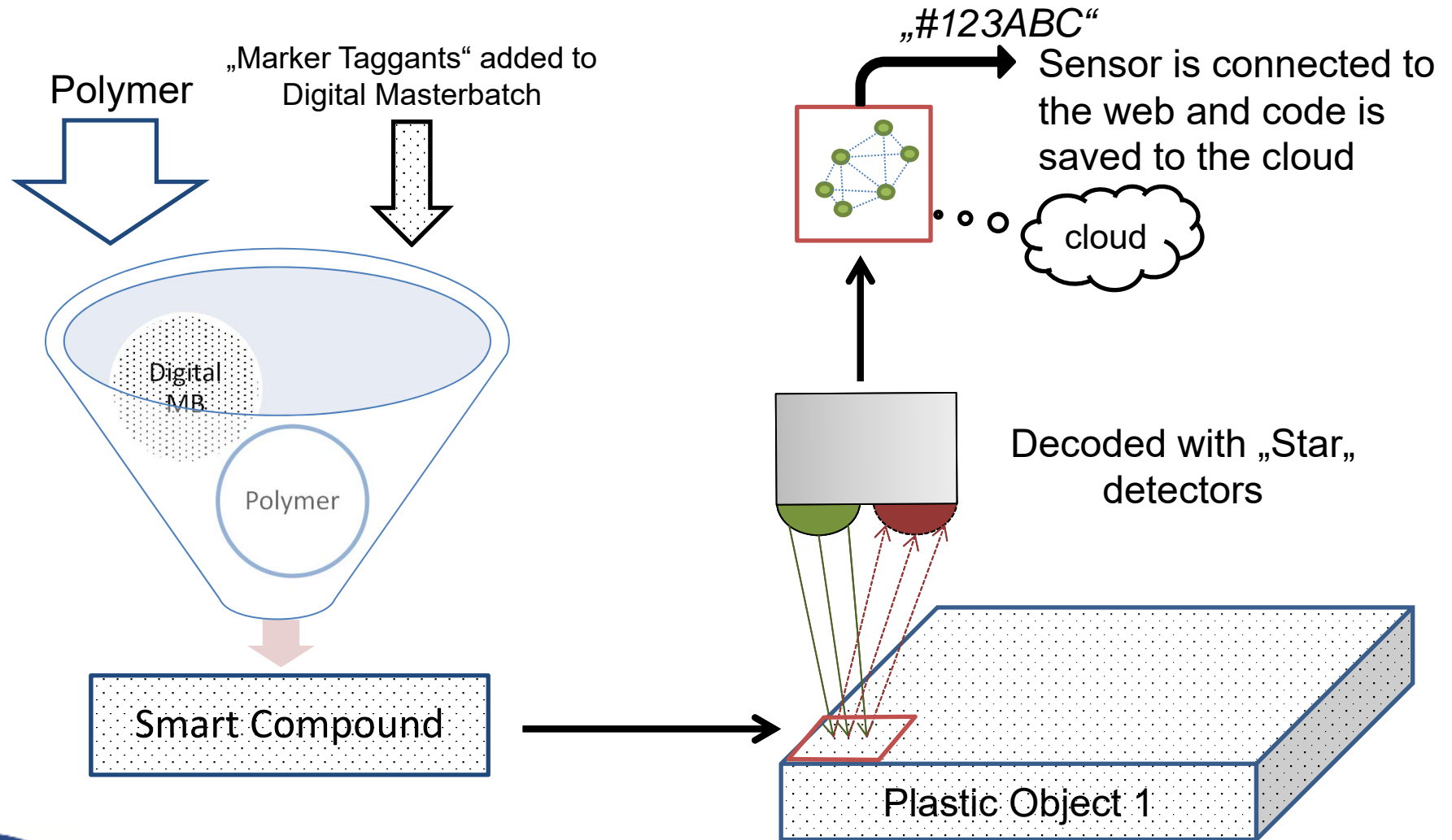


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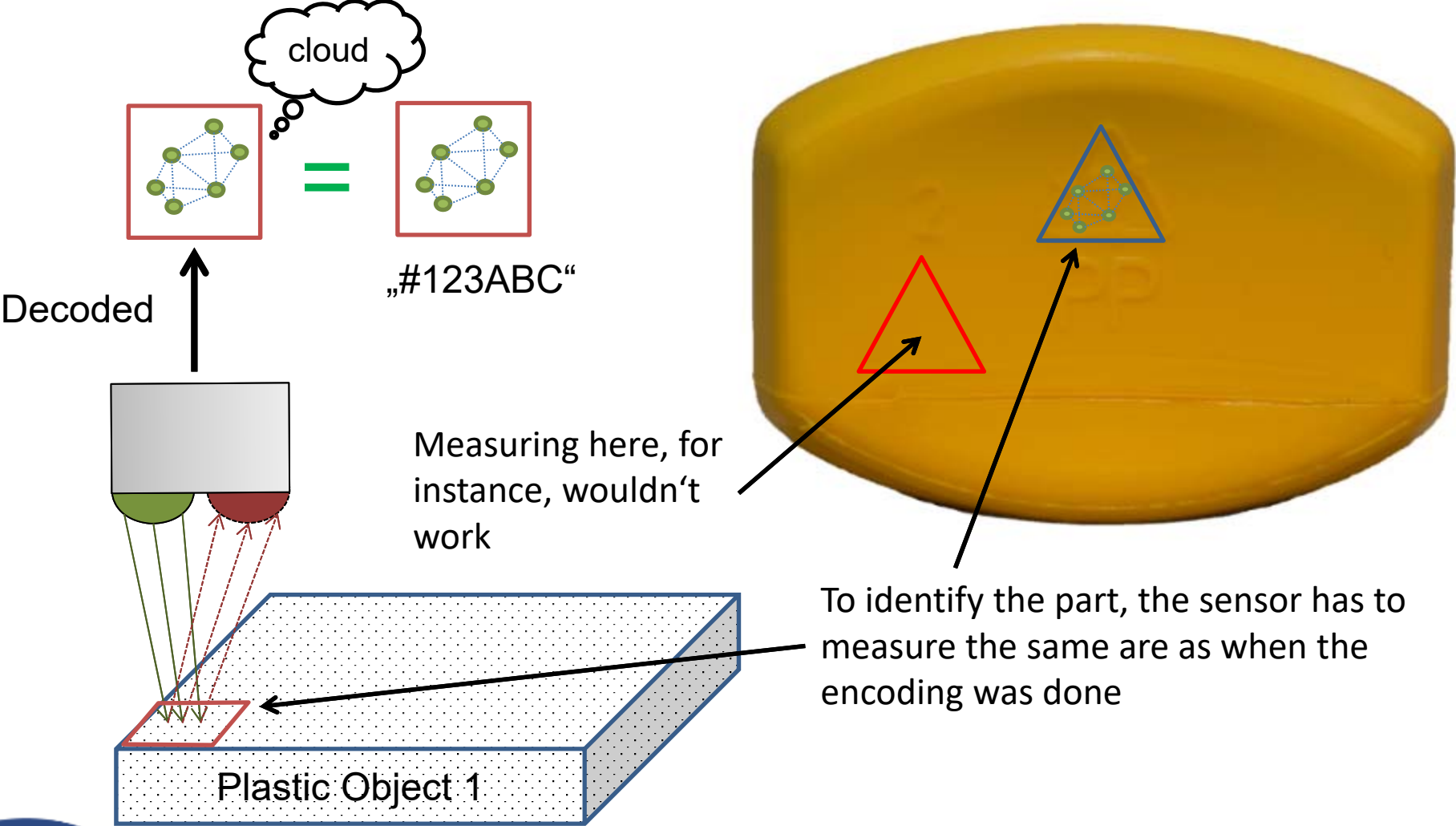
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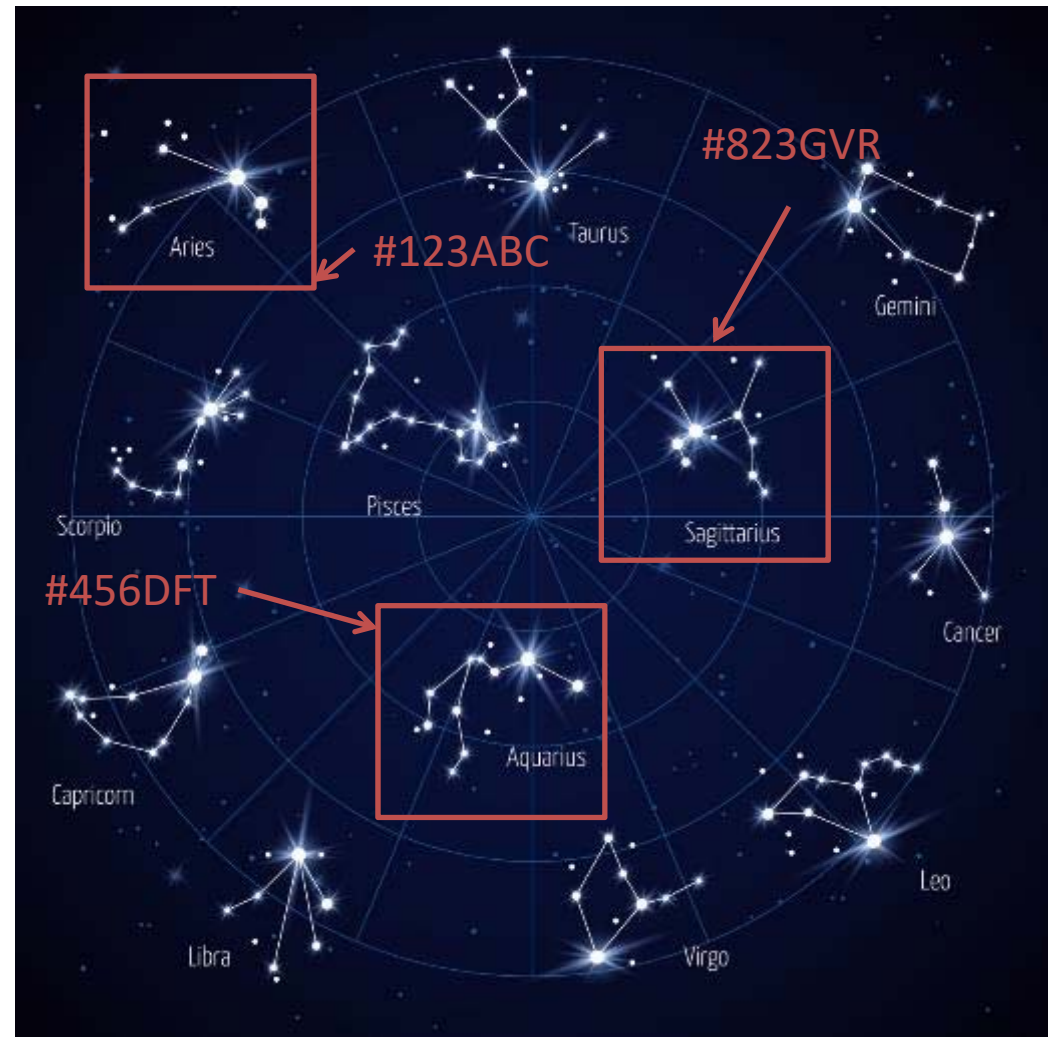


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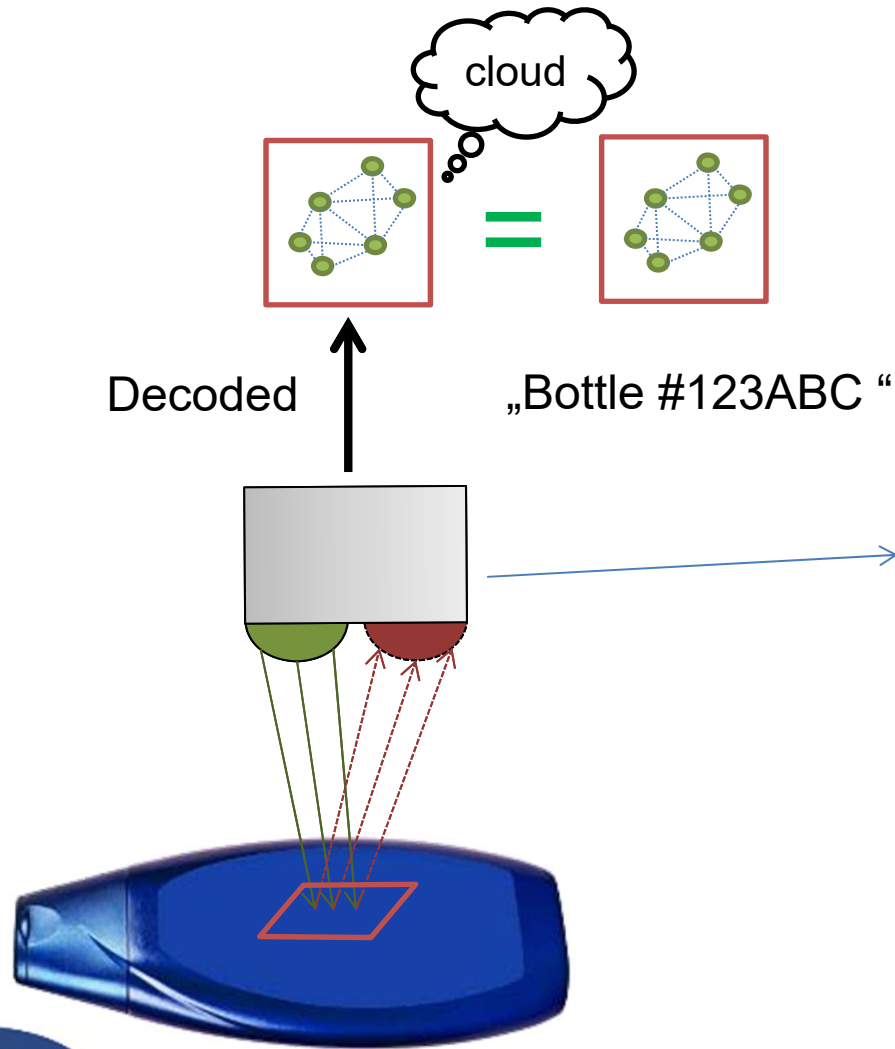


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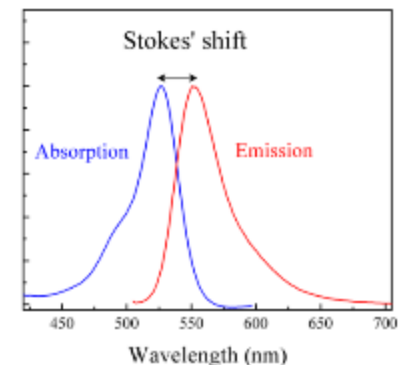
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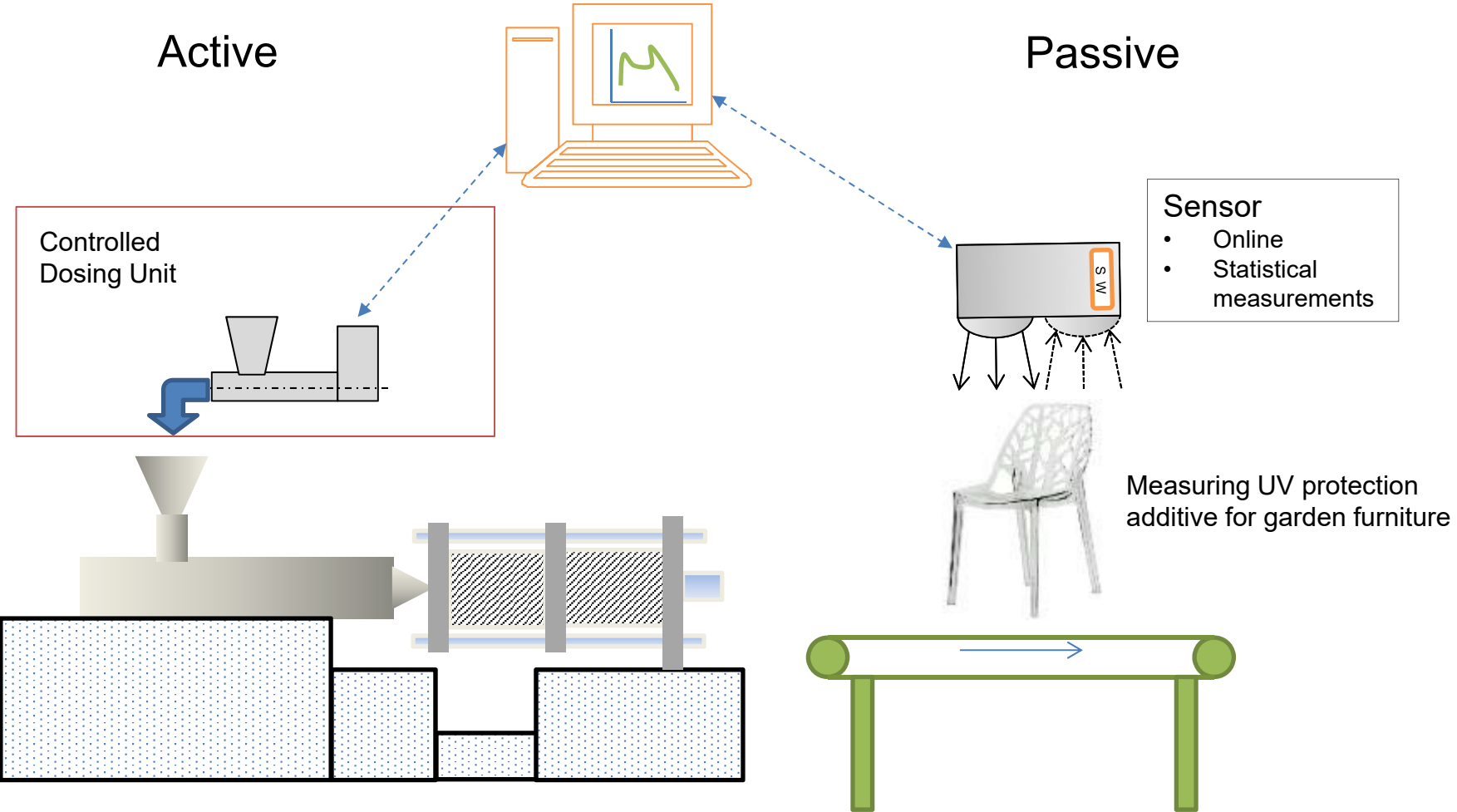
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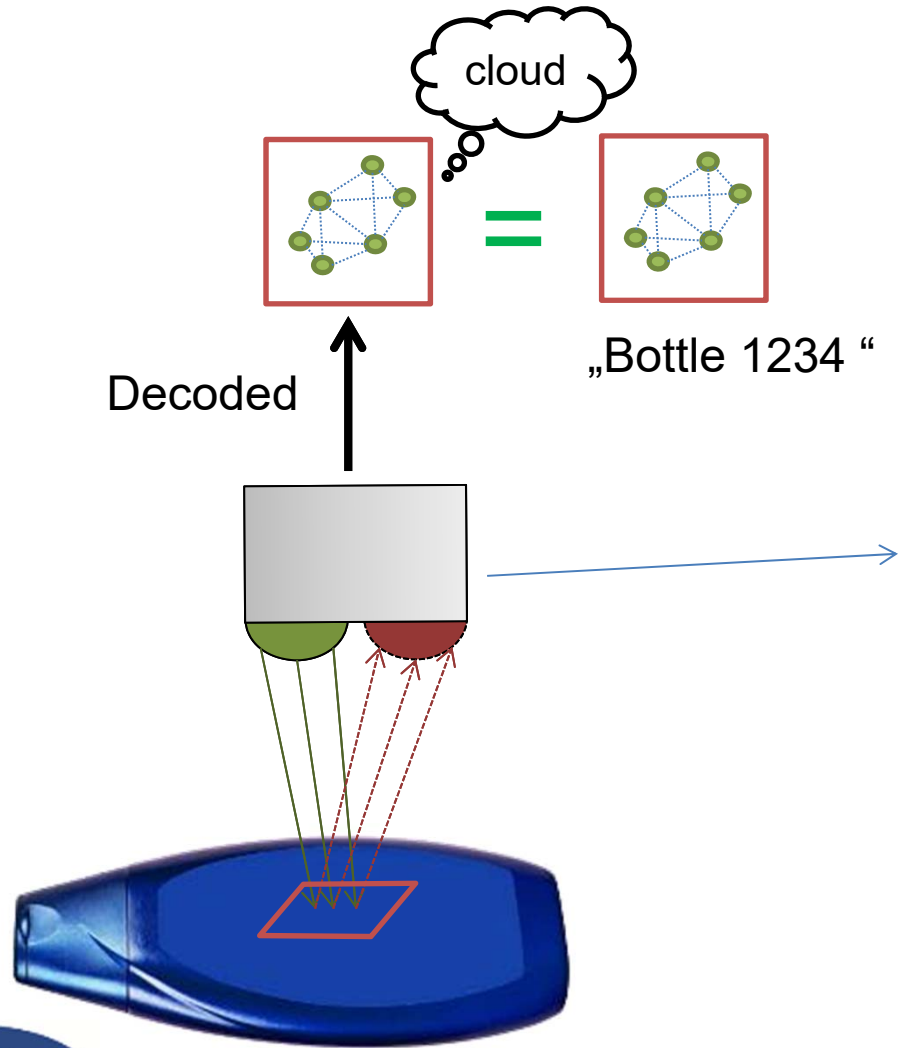
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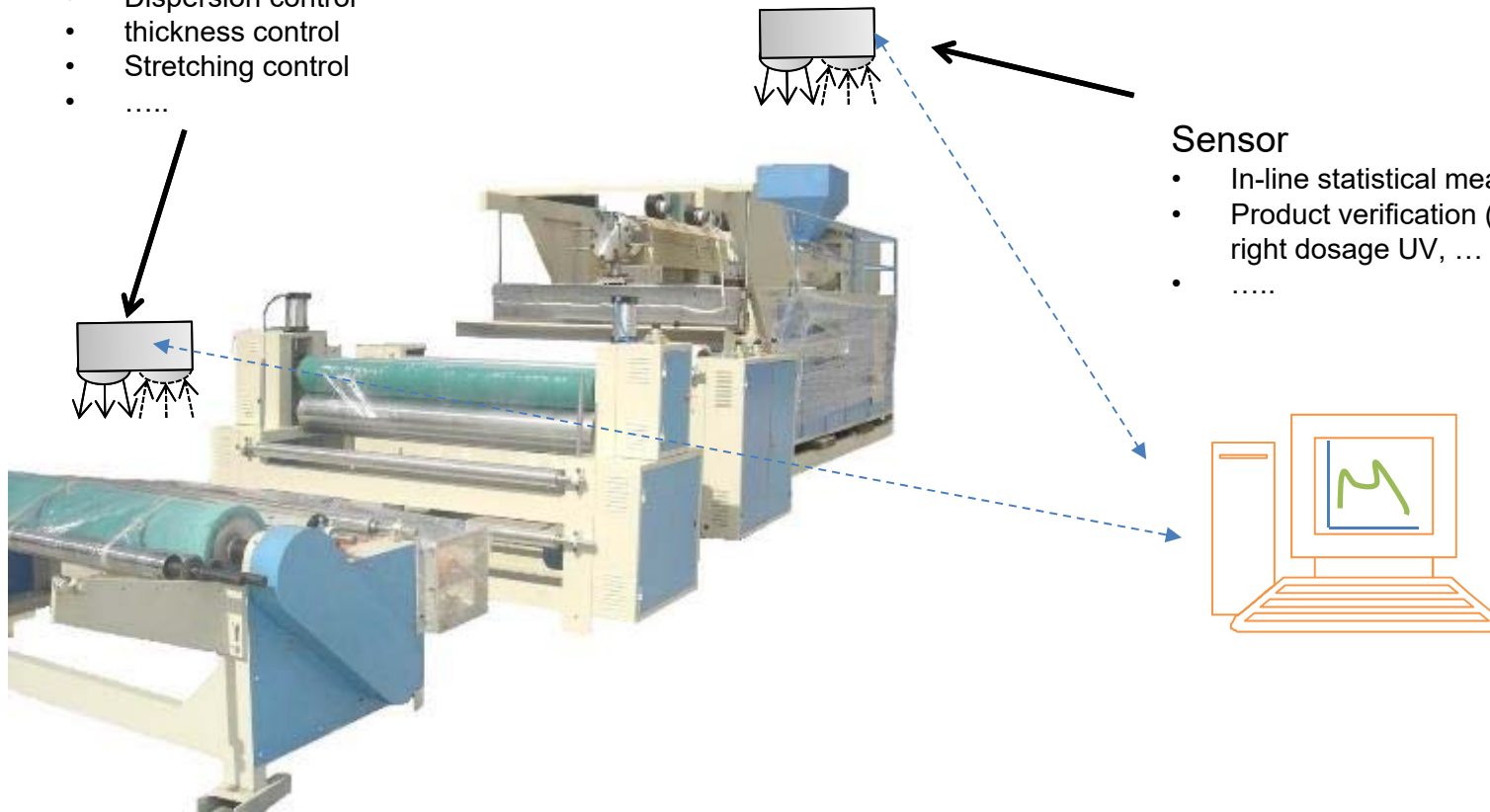
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