

# *Vision Inspection for **Tablet & Capsule***

# PLANET 4.8

## *Tablet and Capsule Vision Inspection*

Smart, Accurate and Precise Inspection

Tablet and Capsule Capability

Free Shape Tablet Application

Time Saving New Product Setup

Rapid Changeover

cGMP Design



Engineering of Vision Inspection by Enclony team began in 1990s.

Year 2000, Capsule inspection machine introduced.

Year 2007, Tablet inspection machine developed.

Year 2011, Combined model for both tablet and capsule inspection in a single machine.

Year 2015, New generation model PLANET inspection machine commissioned.



**PLANET T** for Tablet



**PLANET C** for Capsule

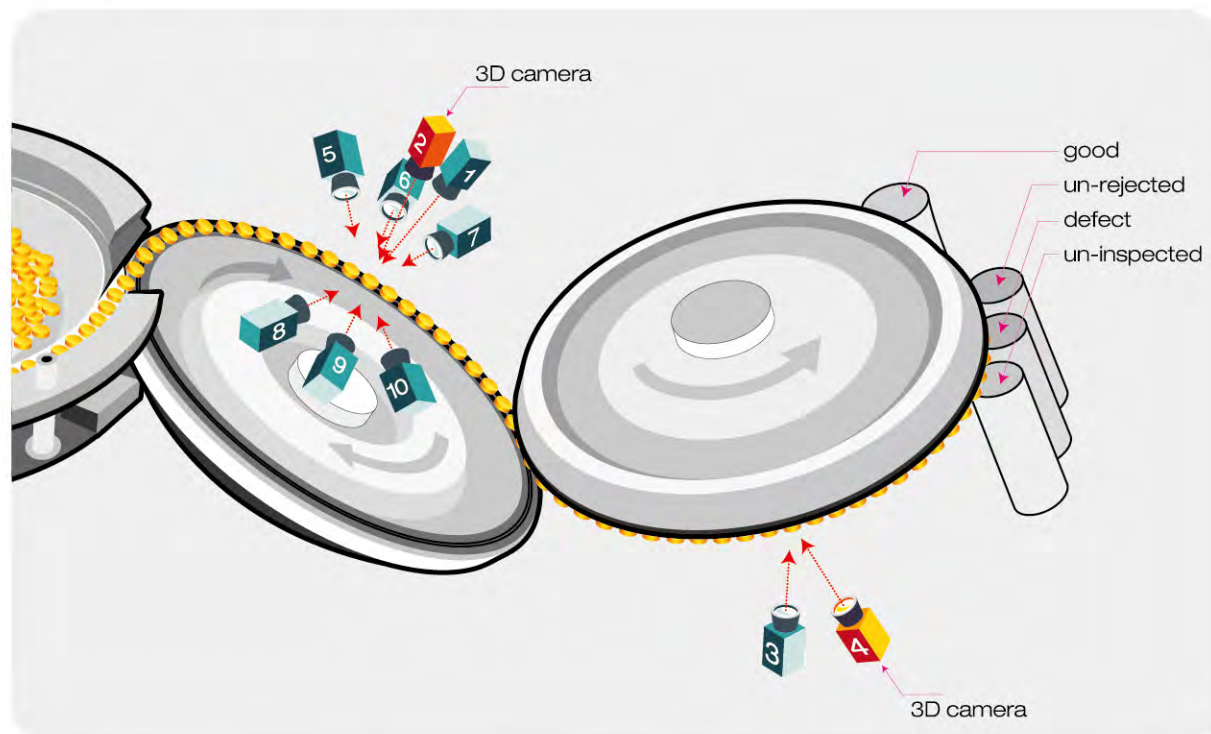


**PLANET TC** for Tablet and Capsule

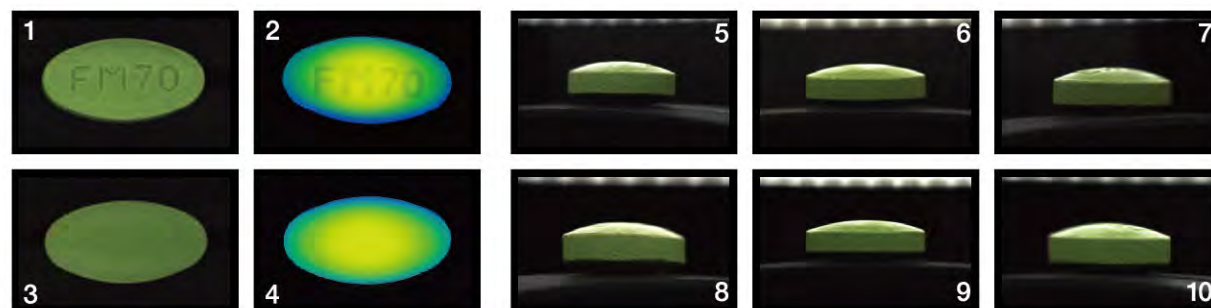


## Tablet Inspection

Eight 2D color cameras and two 3D cameras inspect every single tablet



Each tablet is inspected from eight different directions by eight 2D cameras. Two cameras take images of top and bottom and six cameras from six directions surrounding all sides of tablets by 360°. This ensures that during inspection of tablets there are no blind spots for any tablet shape, especially powerful effect for oblong and free shaped tablets. Two sets of 3D cameras inspect for broken and engraving flaws on the tablet's surfaces.



## Working Station



A clean cGMP design is the key concept for PLANET 4.8. There are no visible cables and no features that block the inspection of any tablet.

## Why 3D Cameras ?

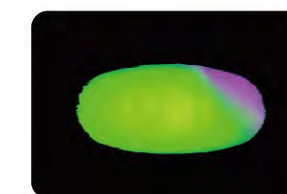
3D cameras are essential for enhanced tablet inspection. They are extremely useful for the detection of engraving chips and broken surface flaws.



Human eye  
as seen by human eye



2D image  
unclear broken area

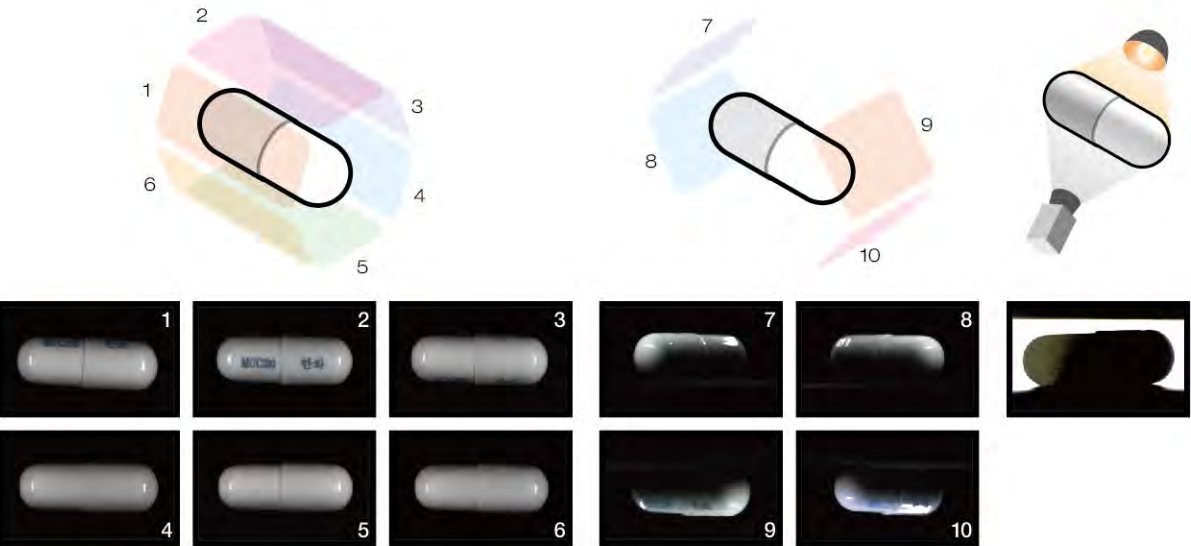


3D image  
clearly identified defect



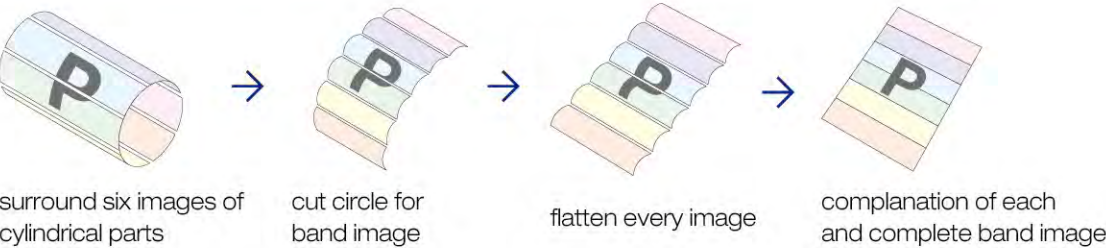
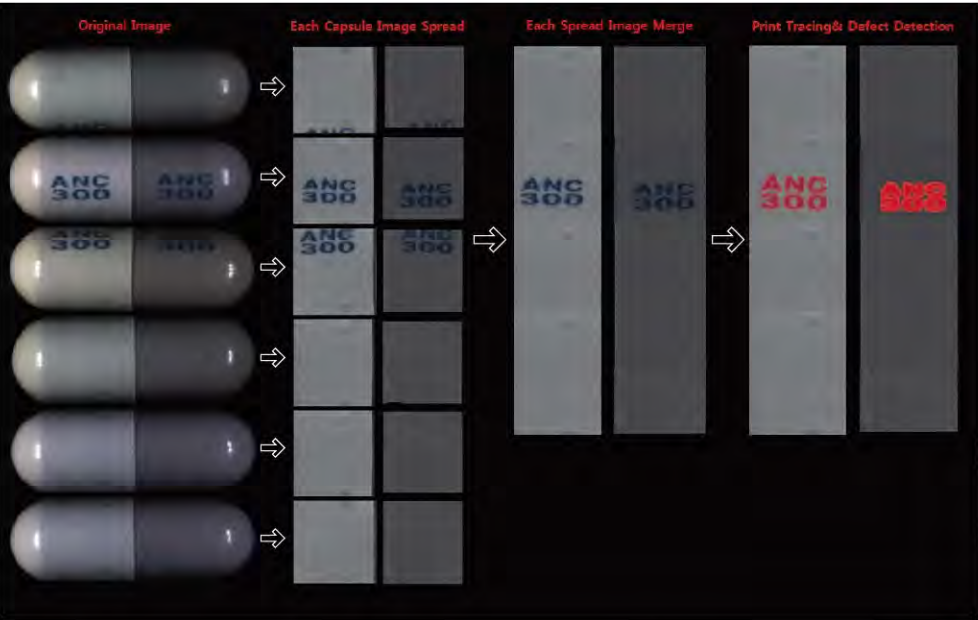
# Capsule Inspection

Eleven 2D color cameras inspect every single capsule. Each capsule is inspected from ten different directions, six cameras are used for 360° inspection of cylindrical parts and four cameras for both rounded ends. One camera checks for empty capsules by using back light effect.



## Cylindrical Part

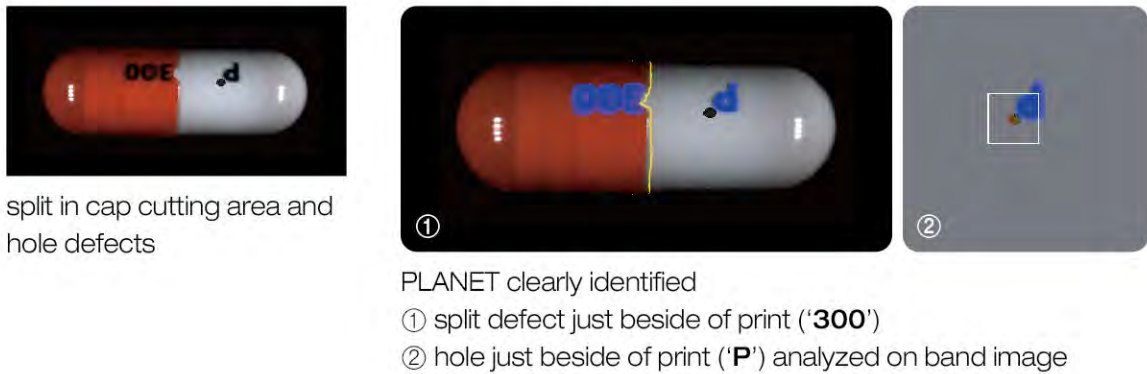
6 images of cylindrical parts are combined and made as a banded image through several steps of image reformation algorithm which is essentially required for detail image analyzation.



## Powerful Inspection by PLANET

### Example 1, Letter Tracing

Print image does not effect to identify defects on capsule.



### Example 2, Joint Line Tracing

PLANET traces joint line on single color of capsule.



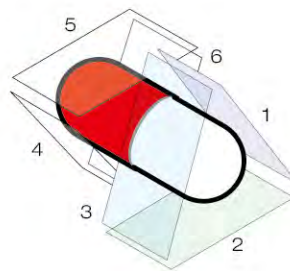
### Example 3, Widely Different Brightness of Cap and Body

PLANET has a special algorithm to divide cap and body to get an optimized image as per specific color on each part. It works well in identifying capsules with widely differing brightness of cap and body.

image for body, lighting sets for bright color (white)



image for cap, lighting sets for dark color (dark red)





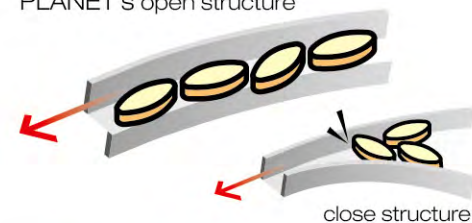
## Wing Door Open

Three side doors open to allow access and visible inspection of all surfaces.

## Jam Free Sorting

PLANET uses an open feed structure to prevent jamming of tablets.

PLANET's open structure



## Dust Protected Enclosed Cameras

All cameras and sensors are hidden inside a glass window and no manual touch is required by operator for cleaning. All glass windows have an air curtain for dust protection.



## Smart HMI

Control is done through Smart HMI which works for not only software control but mechanical setting and fine tuning.



## Outlet

Each tablet is classified as  
1) un-inspected 2) defect  
3) un-rejected and 4) good.

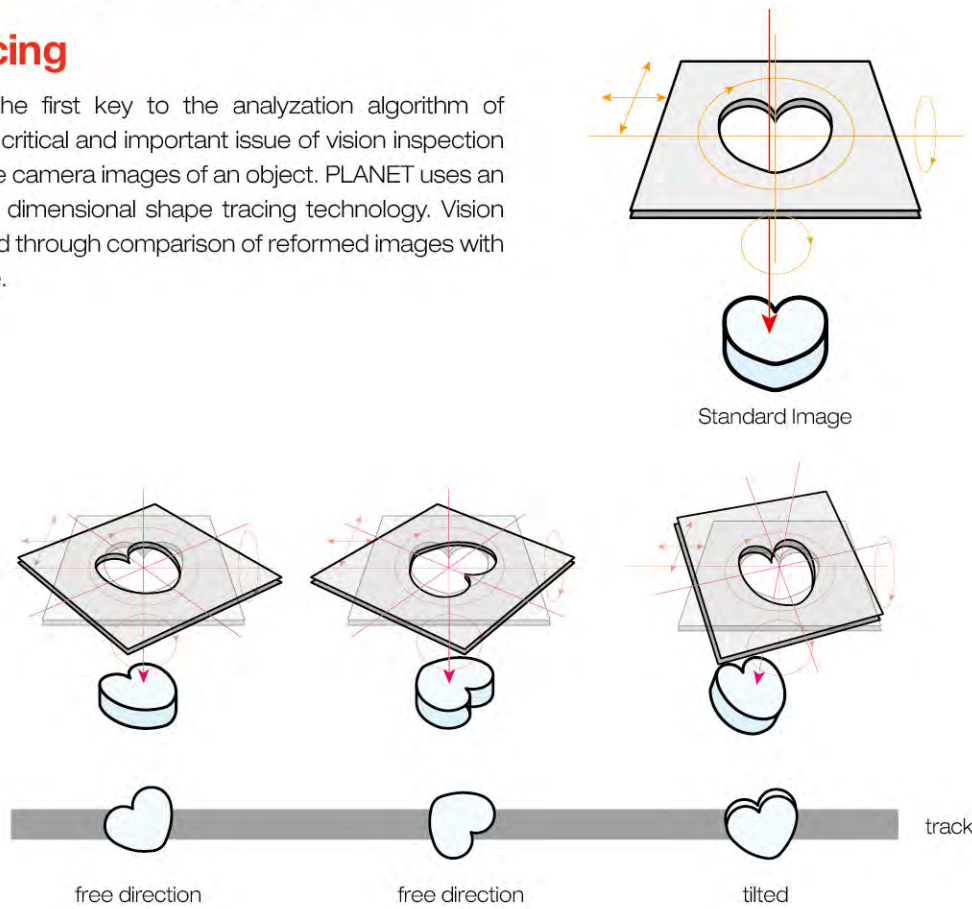




# Analyzing Algorithm

## Shape Tracing

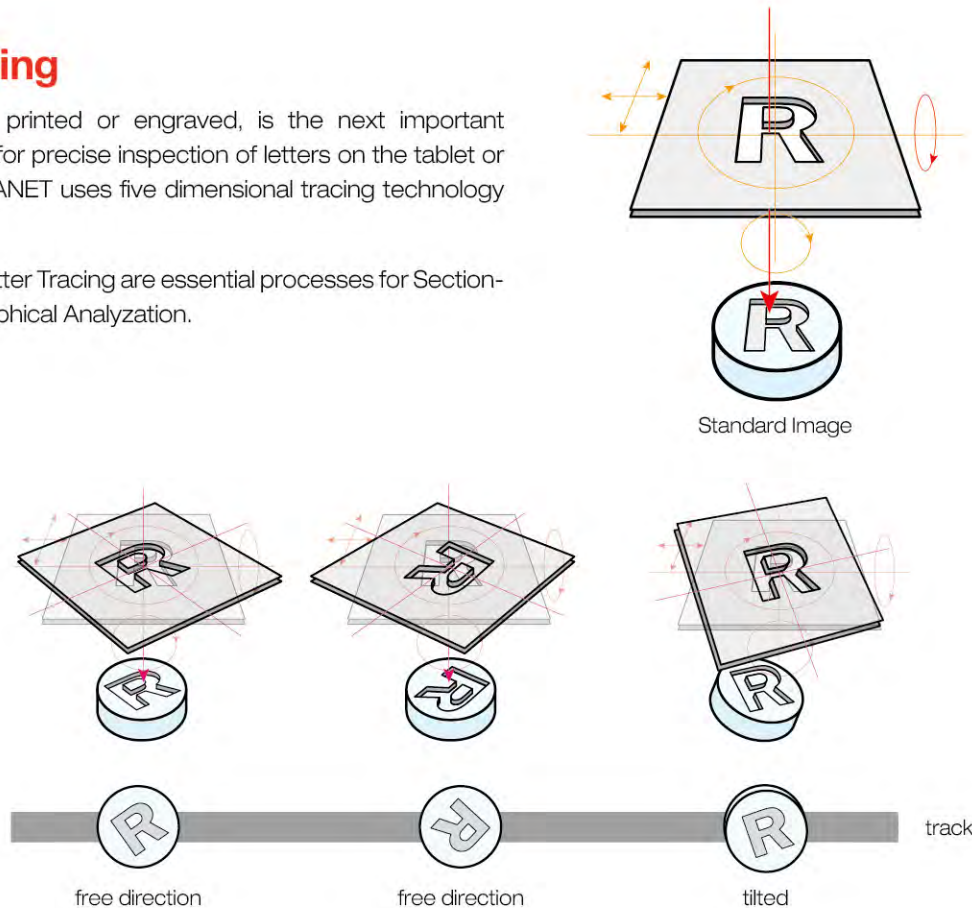
Shape tracing is the first key to the analysis algorithm of PLANET. The most critical and important issue of vision inspection is how to reform the camera images of an object. PLANET uses an algorithm, with five dimensional shape tracing technology. Vision analysis is fulfilled through comparison of reformed images with the standard image.



## Letter Tracing

Tracing of letters, printed or engraved, is the next important technological step for precise inspection of letters on the tablet or capsule. Again, PLANET uses five dimensional tracing technology for letter tracing.

Both Shape and Letter Tracing are essential processes for Sectionization and Geographical Analyzation.



## Sectionization

One single image is sectionized as shown below.

|            |  | letter area | edge of letters | general area | outline area |
|------------|--|-------------|-----------------|--------------|--------------|
| Round      |  |             |                 |              |              |
|            |  |             |                 |              |              |
| Oblong     |  |             |                 |              |              |
|            |  |             |                 |              |              |
| Free Shape |  |             |                 |              |              |
|            |  |             |                 |              |              |

## Geographical Analyzation

Every reformed object image by shape and letter tracing is compared with a standard one, pixel by pixel. This algorithm distinguishes the areas where the letter should be and should not be.

foreign tablet

production batch tablet

case reference

no letter image where should be

letter image where should not be

HNUNA

All above are 49 pixels.

Traditional analyzation

Pixel counting technology gets inspection result as same letters for left images because all of them have same quantities of colored pixel.



## Job Change-Over

### Complete Dismantling, Cleaning and Reassembly without Tools

PLANET is designed for compact Job change-over in less than one hour. Dismantling, cleaning and reassembly are done without tools.



## New Product Setting in 30 Minutes

User friendly design and program, including self-study, allow an operator to set all parameters for a new tablet within half an hour.



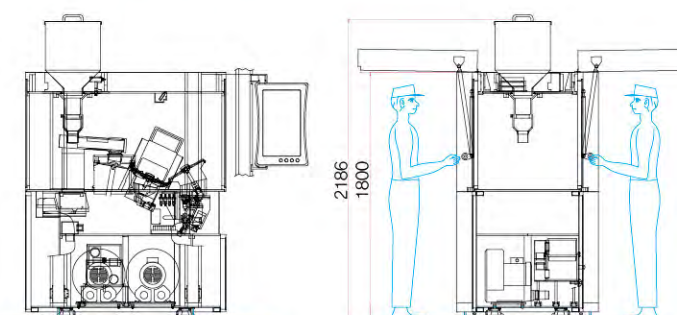
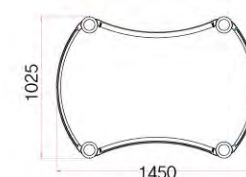
## 128 Multi-Core DSP Board

PLANET's Image Processing Board that is integrated in high density with DSP (Digital Signal Processor) can calculate complex image processing algorithm in real time.

With specialized OS developed by Enclony, it makes maximum inspection capability without error or time delay. Image Processing composed of total 128-Core is, in effect, equivalent to the capability of 30 sets of PCs loaded with latest CPU (on Intel i5 basis).



## Ergonomic Layout



## All Sizes and Shapes of Tablets and Capsules

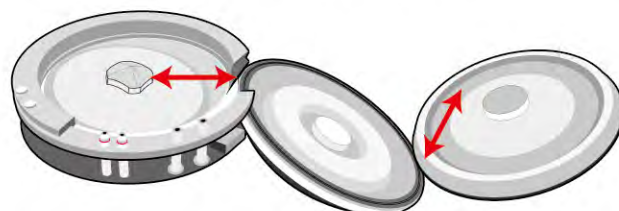
Six sets of change-over parts cover all type of tablets and capsules within the normal range. Custom sized tablets can be inspected but may require custom tooling.



one set of size parts

## Auto-Setting and Product Selection

No manual hand skill is required for adjustments, setting and fine tuning. All motor-powered automatic settings are performed through HMI. To change the job, just select the product name.



## Compliance with CSV

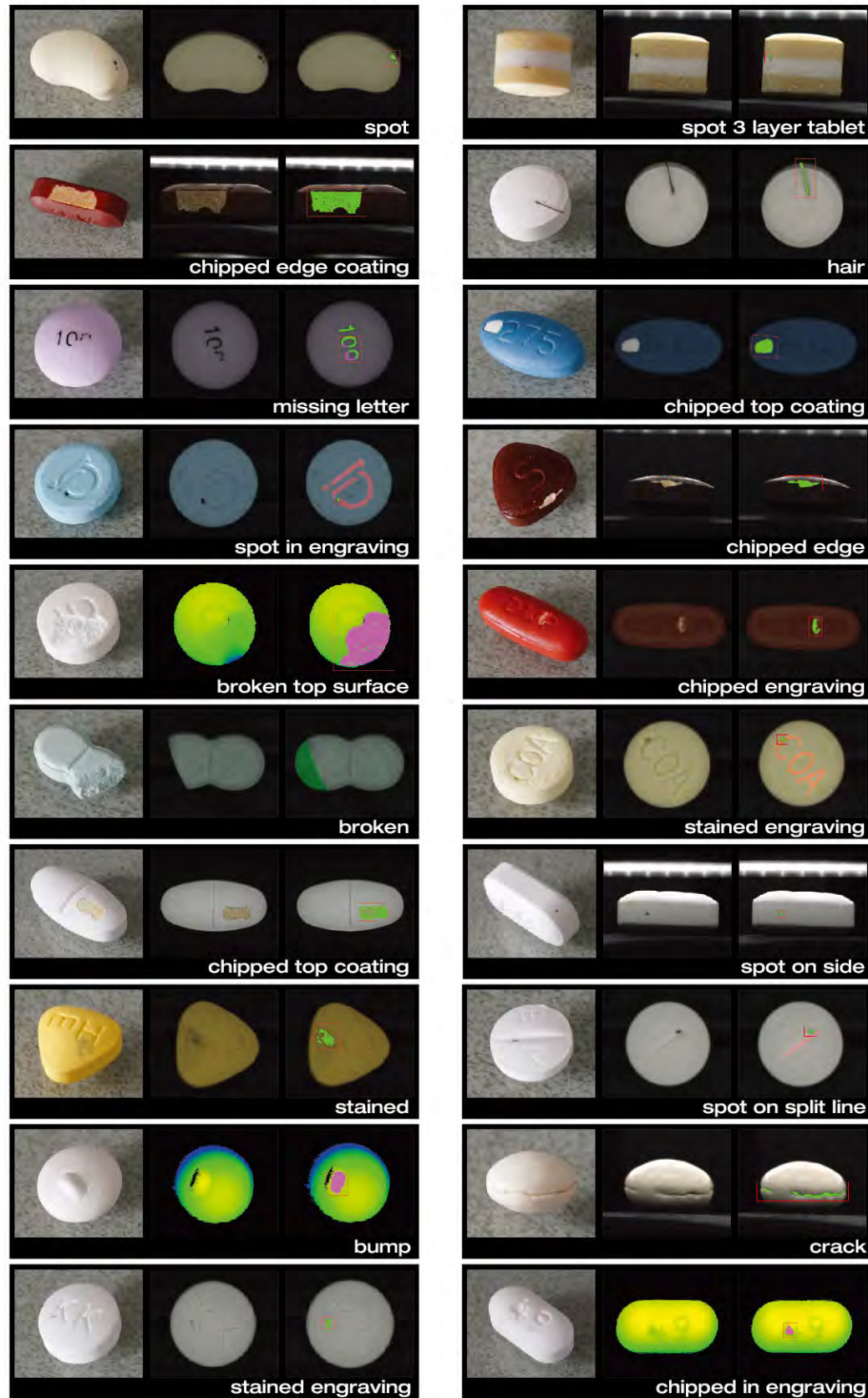
satisfies the strict regulations such as FDA 21 CFR Part 11, EU GMP, GAMP.



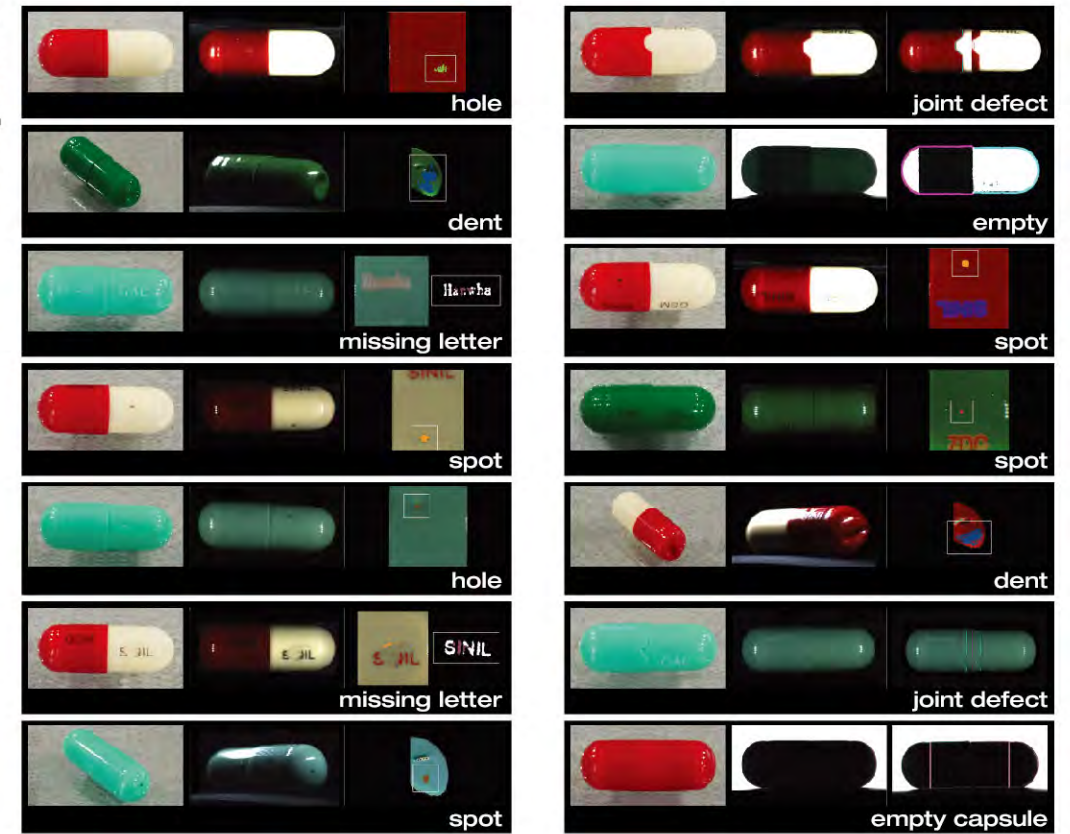
# Defects

## Tablet

human eye camera image analyzed



## Capsule



## Custom Applications / Capabilities



## Effective Output



**Round tablet**  
Diameter allowance, min. 5mm - max. 12mm  
dia. 5mm : up to 350,000 tab./hr  
dia. 7mm : up to 240,000 tab./hr  
dia. 9mm : up to 200,000 tab./hr  
dia. 10mm : up to 180,000 tab./hr  
dia. 12mm : up to 150,000 tab./hr



**Oblong and Oval tablet**  
Length allowance, min. 10mm - max. 21mm  
Width allowance, min. 5mm - max. 12mm  
length 10mm : up to 200,000 tab./hr  
length 14mm : up to 160,000 tab./hr  
length 17mm : up to 130,000 tab./hr  
length 21mm : up to 100,000 tab./hr



**Capsule**  
no. 4 : up to 150,000 cap./hr  
no. 3 : up to 140,000 cap./hr  
no. 2 : up to 130,000 cap./hr  
no. 1 : up to 120,000 cap./hr  
no. 0 : up to 110,000 cap./hr  
no. 00 : up to 100,000 cap./hr

Free shaped tablets are restricted as per above dimension. Custom size may require discussion for custom tooling.

word definition above : d: diameter h: height l: length w: width





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