ENCLONY.COSA

Vision Inspection for
Tablet & Capsule

Next Generation
PLANET 6G *series*

PLANET 6G

Tablet and Capsule Vision Inspection

Tablet and Capsule Capability

Free Shape Tablet Application

Time Saving New Product Setup

Rapid Changeover

cGMP Design

Enclony Produces

Tablet and capsule inspection machines,
Empty hard capsule inspection machines and
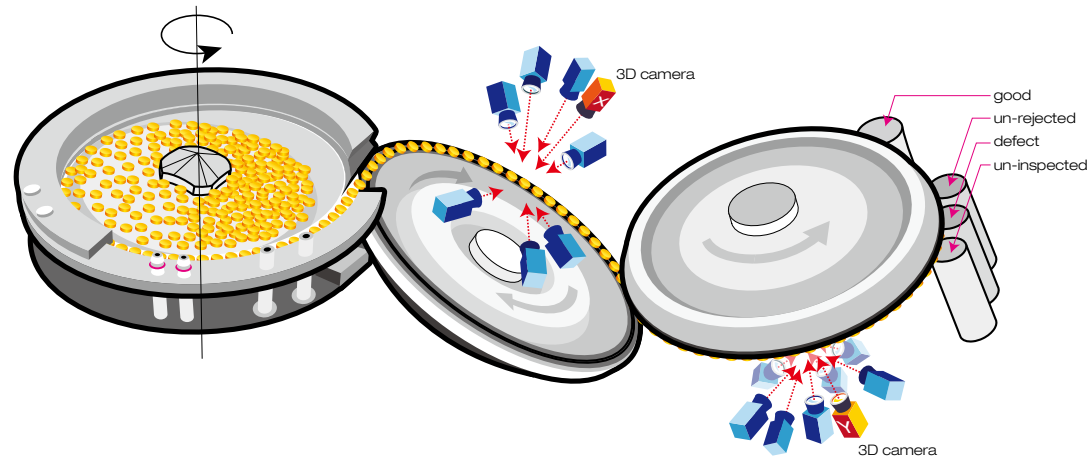Tablet UV Laser printing with inspection machines.

Enclony is committed to continuous research and development
of equipment that contributes to world-class product at
pharmaceutical manufacturing facilities.

PLANET 6G *series*

- PLANET 6G/T for Tablet
- PLANET 6G/C for Capsule
- PLANET 6G/TC for Tablet and Capsule

A clean cGMP design is the key concept for PLANET 6G
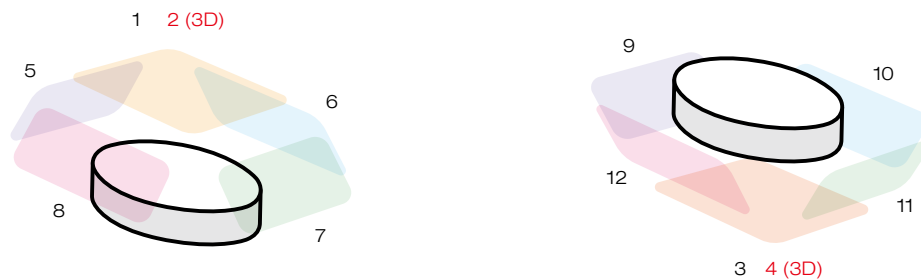
3D camera

good
un-rejected
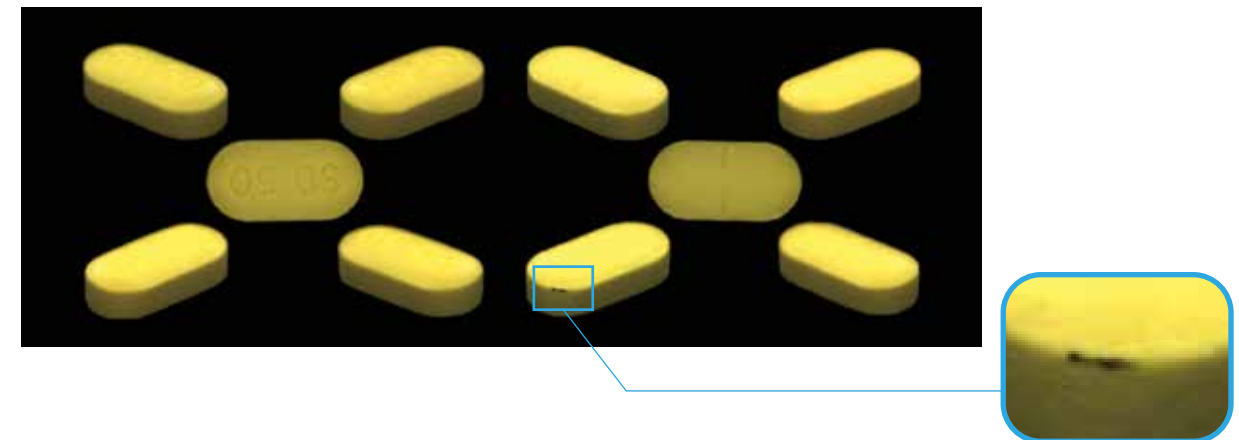defect
un-inspected

3D camera

Tablet Inspection

Each tablet is inspected by ten interdependent 2D cameras capturing the complete surface area. Two additional 3D cameras capture the surface image of both the top and bottom of each tablet.

1 2 (3D)
5
6
8
7

9
10
12
11
3 4 (3D)

PLANET 6G has no Blind Spot

Blind spots have been eliminated by capturing each tablet from eight different angles including top and bottom.
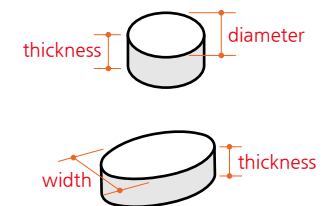
(case of hair on the edge)

Applicable Tablet Flexibility

Round Tablet : diameter allowance **min. 3.5mm - max. 14mm**

Oblong/Oval Tablet : width allowance **min. 3.5mm - max. 14mm**, length allowance **min. 8mm - max. 22mm**

Polygon Shaped Tablets : triangle, square, diamond, pentagon, hexagon, octagon shapes and so on

Free Shapes : heart shape, kidney shape, bean shape, water drop shape, half round shape, almond shape and so on
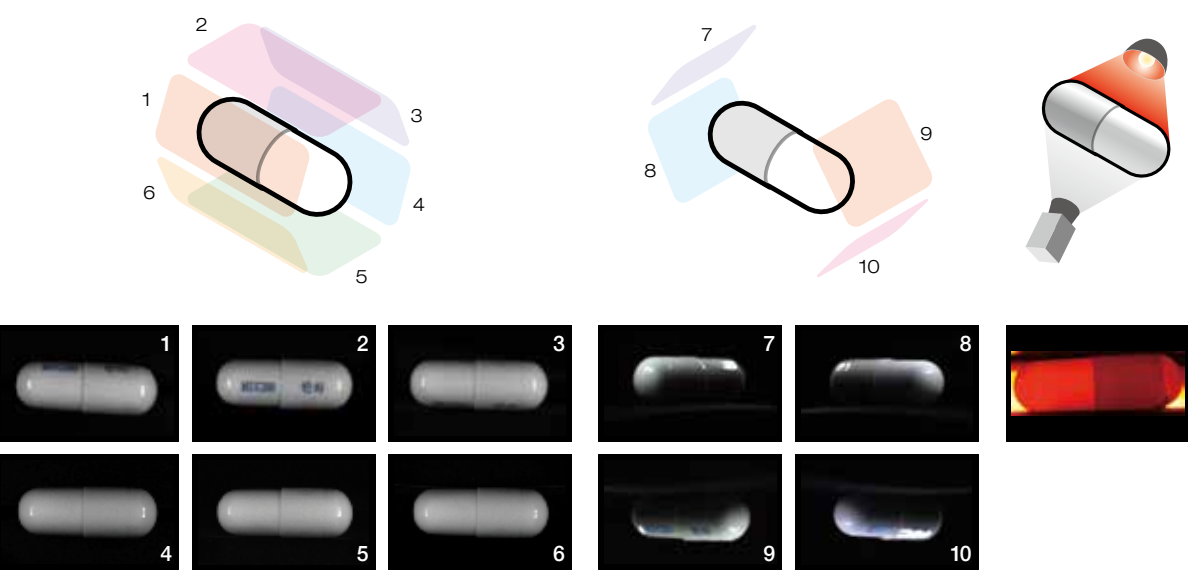
Allowance of Tablet Difference Dimension (TDD = diameter/width – thickness) ≥**0.7mm**

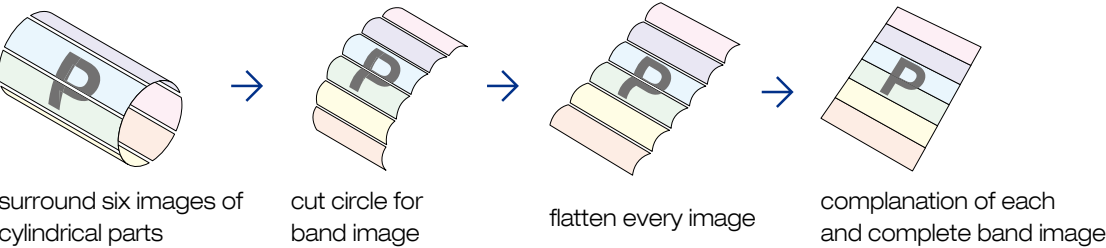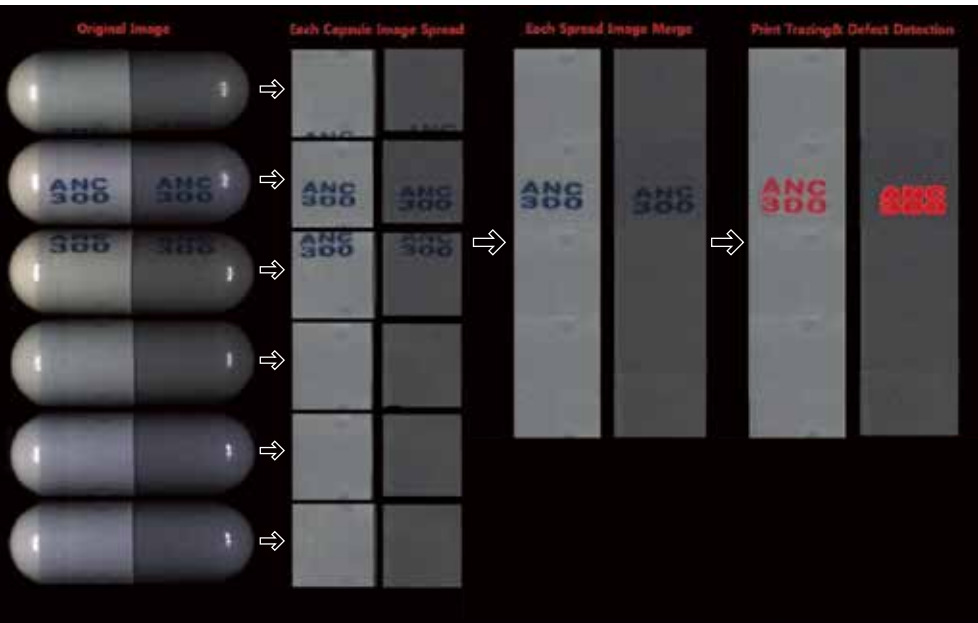thickness   diameter

width   thickness

Capsule Inspection

Each capsule is inspected by ten interdependent 2D cameras capturing the complete surface area. An additional infrared camera identifies empty capsules and checks for filled volume.
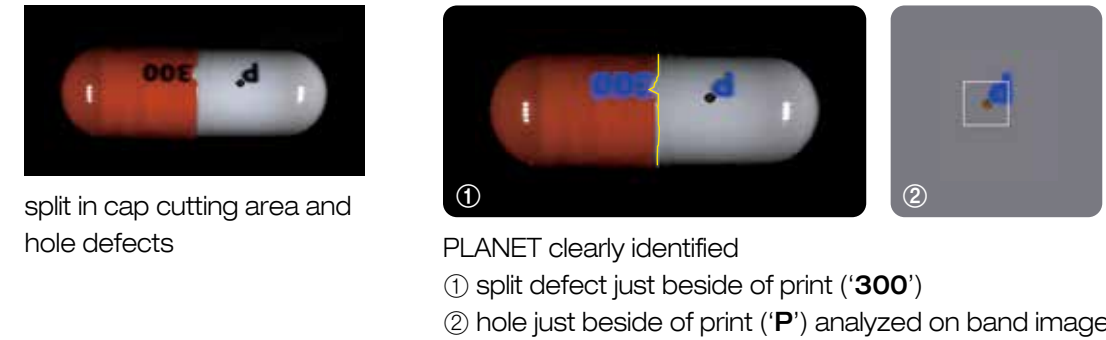
Cylindrical Part

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.
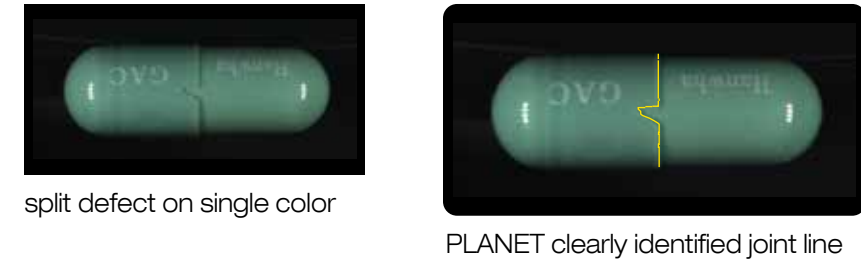
surround six images of cylindrical parts

cut circle for band image

flatten every image

complanation of each and complete band image

Powerful Capsule Inspection by PLANET

Example 1, Letter Tracing

Print image does not effect to identify defects on capsule.

split in cap cutting area and hole defects

① 　②

PLANET clearly identified
① split defect just beside of print ('**300**')
② hole just beside of print ('**P**') analyzed on band image

Example 2, Joint Line Tracing

PLANET traces joint line on single color of capsule.

split defect on single color
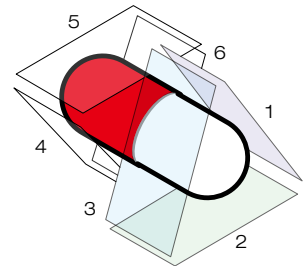
PLANET clearly identified joint line

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.

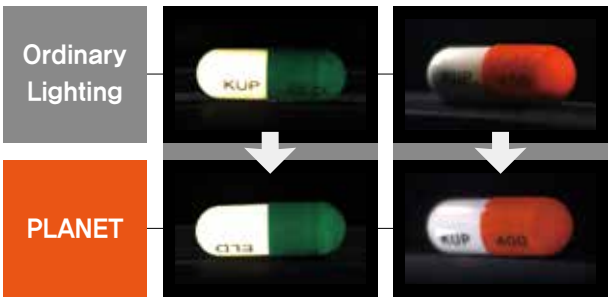image for body, lighting sets for bright color (white)

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

New Lighting System

New lighting system makes almost equal brightness to everywhere of capsule which minimizing of shadow.

Ordinary Lighting

PLANET

4 Sides Wing Door Open
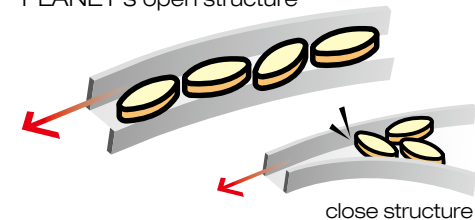
Allows full access to the inspection process path.

Smart HMI

Controlled through a very intuitive Smart HMI. This interface controls mechanical setting, inspection fine tuning, and all compliance reports.

Jam Free Sorting

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

PLANET's open structure

close structure

Dust Protected Enclosed Cameras

All cameras and sensors are placed behind glass windows. A protective air curtain reduces dust accumulation.

Humidity and Temperature sensor

Continuous monitoring of the inspection environment allows the Planet to notify the operator of any conditions that are outside the set range.

Discharge

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

Threshold free edge

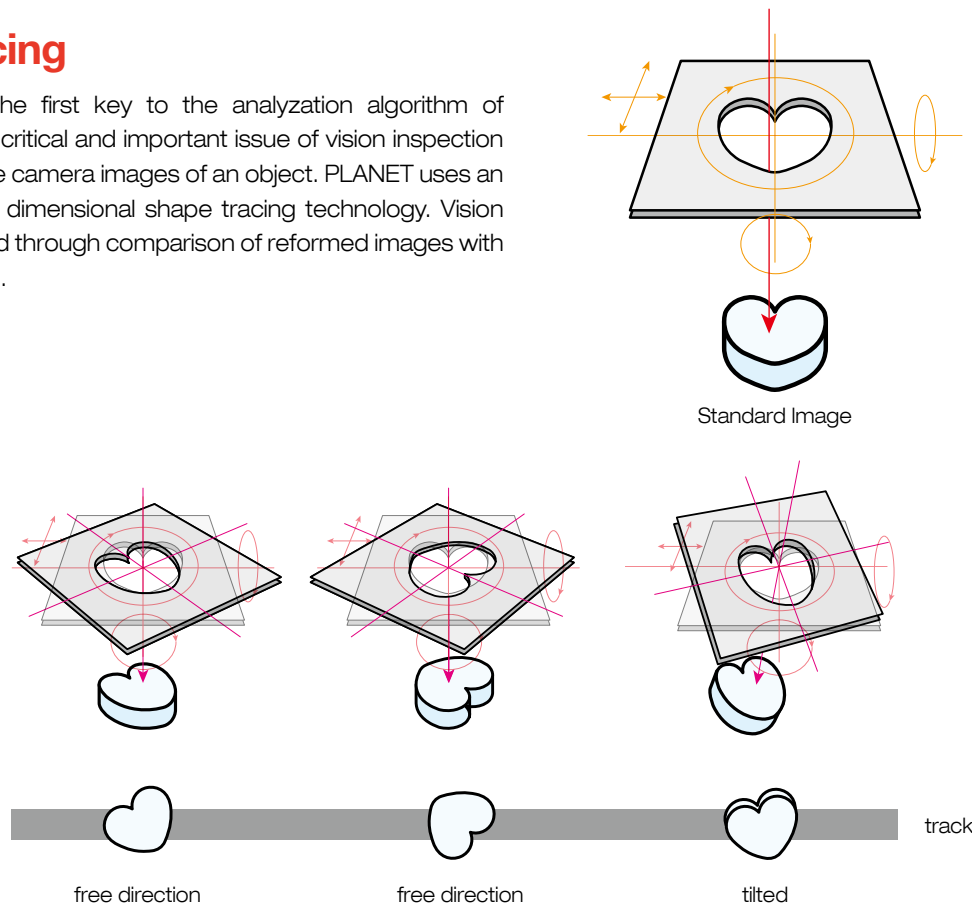Neat outline design for easy cleaning

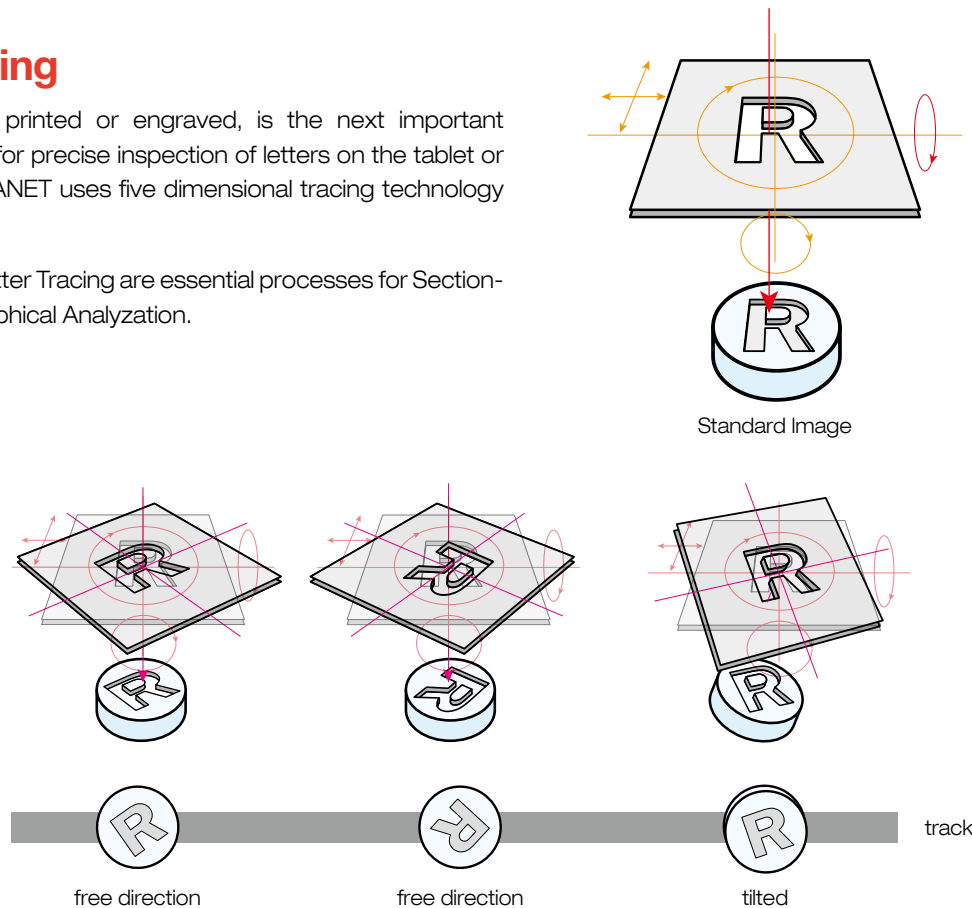PLANET 6G

Analyzing Algorithm

Shape Tracing

Shape tracing is the first key to the analyzation 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 analyzation is fulfilled through comparison of reformed images with the standard image.

Standard Image

free direction   free direction   tilted

track

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.

Standard Image

free direction   free direction   tilted

track

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

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

PLANET is designed for compact Job change-over in less than one hour. Dismantling (5 min.), cleaning and reassembly (5min.) are done without tools
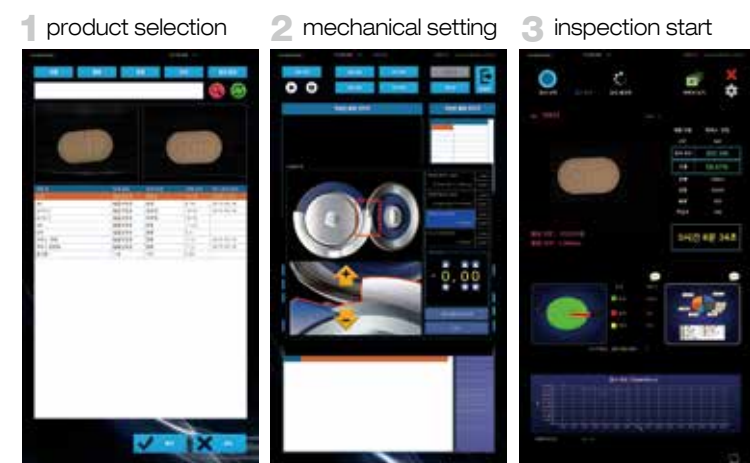
New Product Setting in 30 Minutes

No factory support is required. The intuitive Smart HMI guides the operator thorough the process of programing a new product. These 6 steps can be completed within 30-35 minutes.

enter tablet dimension **1**

mechanical setting **2**

capture 100 images **3**

image extraction **4**

self-study **5**

trial run and confirm **6**

Setup Product

1 product selection   **2** mechanical setting   **3** inspection start

Once a product recipe has been created, it's a short 3 step process to start an inspection.

Change Parts

The Planet is only mechanically dependent on the width/diameter of the product. With each set of tools covering 1mm of width/diameter, most products can be inspected with 4 to 8 sets of change parts.

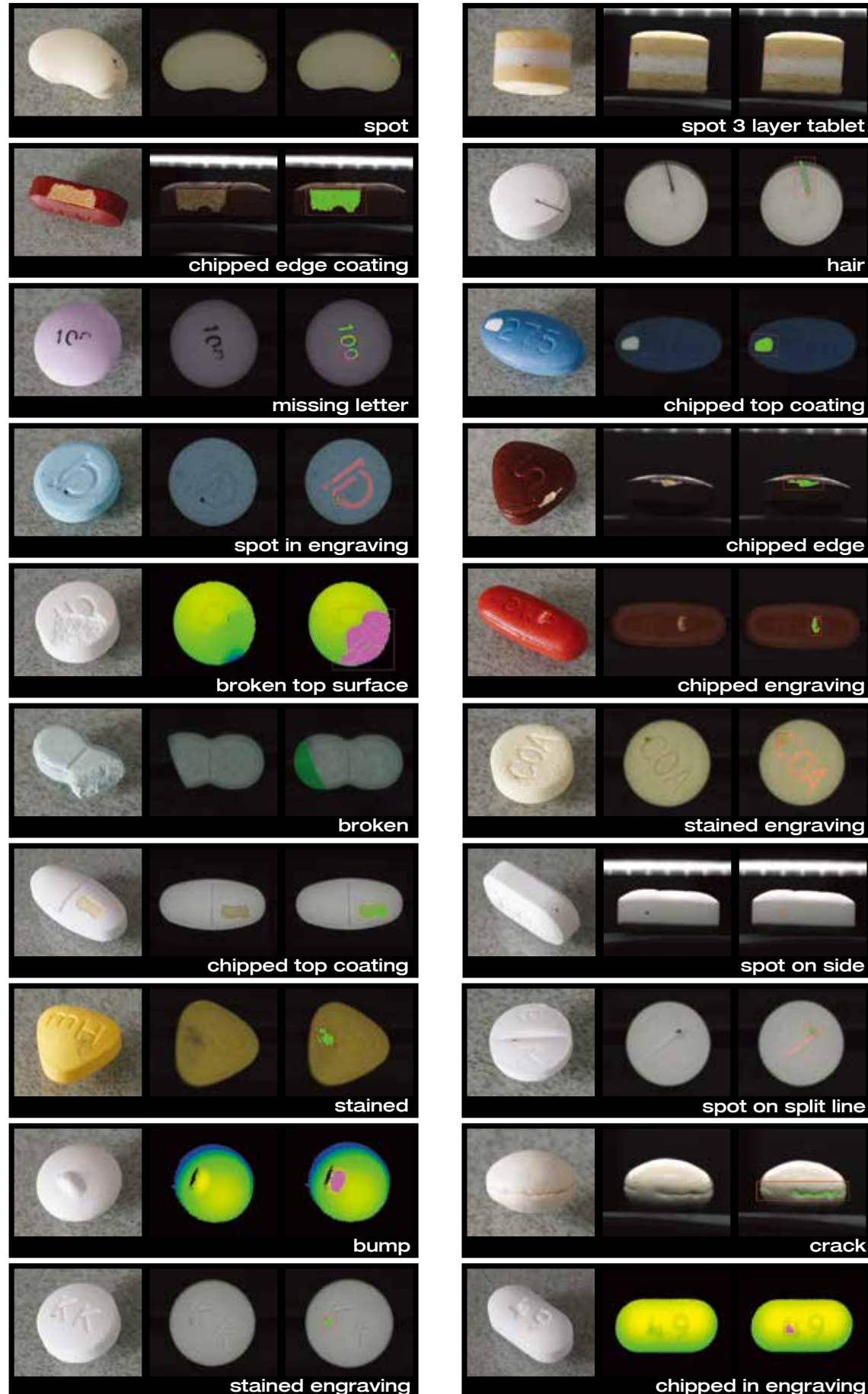one set of size parts

Auto-Setting of Mechanical Gaps

Product dimensions are programmed through the Smart HMI. All these parameters are saved in each product recipe for easy recall later.

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).

Compliance with regulations

FDA 21 CFR Part 11, CE, EU GMP, GAMP, UL and so on as option

Tablet

human eye   camera image   analyzed

spot

chipped edge coating

missing letter

spot in engraving

broken top surface

broken

chipped top coating

stained

bump

stained engraving

spot 3 layer tablet

hair

chipped top coating

chipped edge

chipped engraving

stained engraving

spot on side

spot on split line

crack

chipped in engraving

Capsule

hole

dent

missing letter

spot

hole

missing letter

spot

joint defect

empty

spot

spot

dent

joint defect

empty capsule

Ergonomic Layout

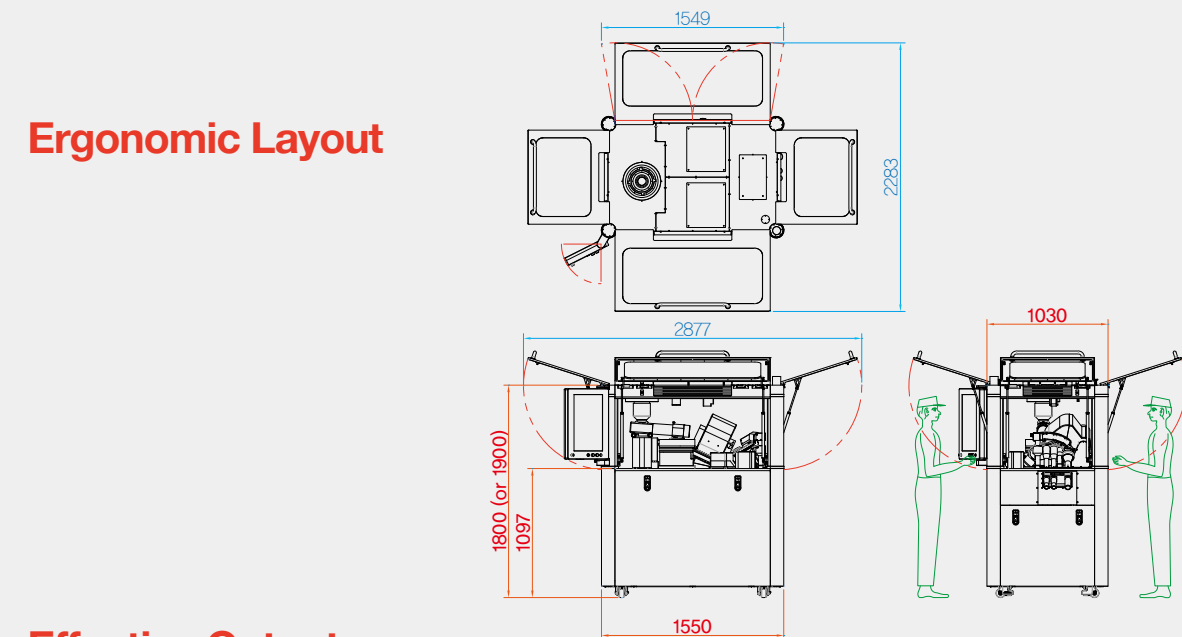## Effective Output

Round tablet
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 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. Actual output is subject to product specific characteristics

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