



# CONVEL

design and manufacturing  
of inspection machines

*Taipei, 14<sup>th</sup> May 2012*

*Seminar on leak test and particles inspection*

**UTEK INTERNATIONAL COMPANY**

**SUMMARY****Part 1**

**Leak detection  
Particles inspection**

**Part 2**

**Presentation of Convel  
Products overview  
TS – Leak detection machine  
C2/C2D – Automatic particles inspection machine**

***LEAK DETECTION***

**METHODS FOR LEAK TEST**

Method	Description	Advantages	Drawbacks
<i>Methylene blue bath</i>	<p>Samples of containers are put in a bath of dye and pressure is applied .</p> <p>Colour enters inside leaking containers changing the colour of liquid.</p> <p>Containers are then rechecked to recognize and reject the coloured ones</p>	<ul style="list-style-type: none"> <li>■ Easy to be performed without skilled people</li> </ul>	<ul style="list-style-type: none"> <li>■ Possibility to send out a leaking container due to wrong visual recheck</li> <li>■ Difficulty to be applied to coloured products</li> <li>■ Difficulty to be applied to vials</li> <li>■ Slow</li> <li>■ Problem of cleaning the container of the bath and to waste the dye</li> <li>■ Low sensitivity</li> <li>■ Suitable only to test samples and not 100% of production</li> </ul>

**METHODS FOR LEAK TEST**

Method	Description	Advantages	Drawbacks
<p><i>Vacuum/Pressure cycle in autoclave</i></p> <p><i>Standing ampoules</i></p>	<p>A cycle of high pressure is performed inside the autoclave. Due to the difference of pressure, the tips of leaking containers explode. The ampoules are then rechecked for missing or broken tips.</p>	<ul style="list-style-type: none"> <li>■ Ampoules with broken tips are easy to be recognized</li> </ul>	<ul style="list-style-type: none"> <li>■ All containers must be rechecked</li> <li>■ The method can detect only big cracks present only in the tips, bottom part is excluded</li> <li>■ Sensitivity is very low</li> </ul>
<p><i>Vacuum/Pressure cycle in autoclave</i></p> <p><i>Upside – down ampoules</i></p>	<p>Ampoules are put upside down inside the autoclave A cycle of high pressure is performed inside the autoclave. Due to the difference of pressure, the liquid goes out from the leaking tip . The ampoules are then rechecked by automatic inspection machines for filling level</p>	<ul style="list-style-type: none"> <li>■ Easy</li> <li>■ Higher sensitivity for the detection of the cracks in the tip with respect to standing ampoules method</li> </ul>	<ul style="list-style-type: none"> <li>■ The method can detect cracks present only in the tips, bottom part is excluded</li> <li>■ Sensitivity is low</li> <li>■ Very slow and tedious due to the need to reverse the ampoules</li> <li>■ Inspection machines are usually not setup to detect the difference in filling level due to leaks of just some drops</li> </ul>

**METHODS FOR LEAK TEST**

Name	Description	Advantages	Drawbacks
<p><i>High Voltage</i></p>	<p>An high voltage (up to 35 KV) is applied to the container and the current passing through it is measured.</p> <p>In case of presence of microcracks, the liquid inside the ampoule becomes conductive.</p>	<ul style="list-style-type: none"> <li>■ Fast automatic test on 100% of production</li> <li>■ High sensitivity (cracks in the range of micron)</li> <li>■ 100% of container surface can be tested</li> <li>■ Easy to be applied to all types of containers, vials with metallic alucap sealing too</li> </ul>	<ul style="list-style-type: none"> <li>■ Applicable only to liquid products</li> <li>■ Depending on conductivity of the product (distilled water or oily products are difficult to be tested)</li> </ul>

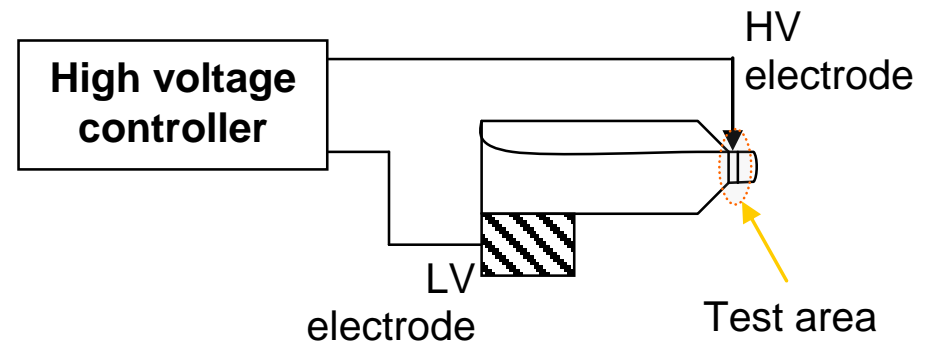
## PRINCIPLES OF HIGH VOLTAGE METHOD

High voltage sparks are generated between the tip and the bottom of the container.

Glass is a perfect isolating material: only minimal current passes through a perfectly sealed container.

In case of microholes, the liquid inside makes a kind of 'short-circuit'; so a high current passes through it

Necessary condition is that liquid wets all the internal sideglass of the container from the bottom up to the top. That's why it is required the positioning in horizontal





## GENERATION OF HIGH VOLTAGE

The maximum voltage required for this application is in the range of 30-40 KV .

A dedicated transformer is required to generate it from low voltage and a resistors shunt to limit the current passing through the container.

Convel electronic generates trains of pulses of sparks up to 40 kV at about 800 Hz; with respect to methods based on DC current, it has the important advantage to reduce the overheating of transformer and of circuitry and to control the average energy transferred to the container.

These pulses are generated by a compact and rugged electronic device all included in a metallic box.





## MEASUREMENTS

The signal coming from the system electrodes + ampoule must then be analyzed.

Two values are used to analyze the signals:

*Peak value:* proportional to the maximum current

*Average value:* Convel has patent pending a special algorithm to calculate a kind of average signal in case of pulsed sparks

**Note:** the measurements give information about the presence of the crack and not about its dimension



## OPERATORS SAFETY AND PRODUCT DEGRADATION

Production of high voltage sparks doesn't damage the normal product.

Very few energy, even less than 0,8 J in case of Convel technology, is transferred to the container.

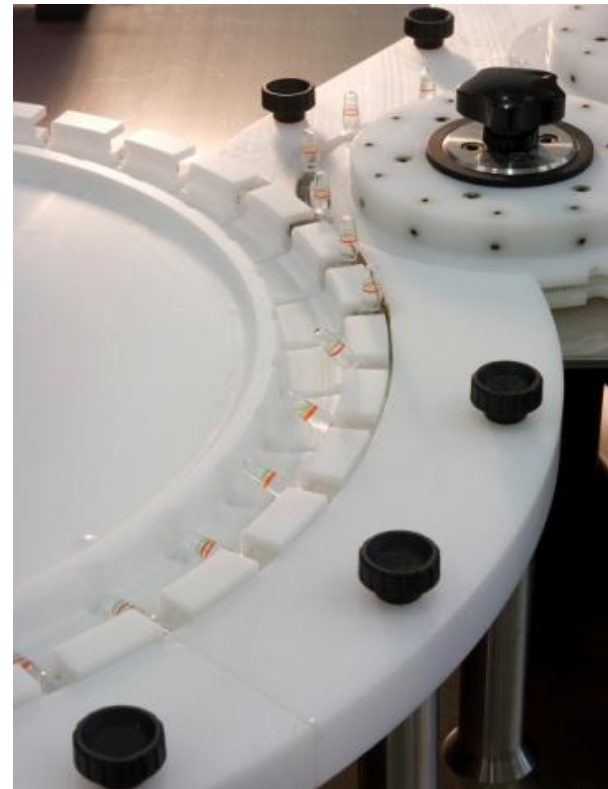
Inactive vaccines can be tested too.

The 'stability test', performed before and after inspection, is used to verify it.

Test isn't dangerous for the operator: only minimal current passes through the electrodes.

However, for full safety, the spark isn't emitted when covers are open

The high voltage has the natural effect to produce ozone ( $O_3$ ) that must be evacuated by the working area



## **VALIDATION OF HIGH VOLTAGE METHOD**

***Highest sensibility method:*** microcracks in the range of 1-10 micron, compatible with microorganism dimension, can be detected



**Validation is performed testing containers with calibrated holes**

**A laser is used to create holes of various calibrated diameters covering the range of 10 – 100 micron for validation test**


**Several systems 'homemade' to create holes can be easily performed to prepare batches with holes, not calibrated, in the range 70 - 100 micron for periodical check**

***PARTICLES INSPECTION***

## METHODS FOR PARTICLES INSPECTION

Method	Description	Advantages	Drawbacks
<p><i>Manual inspection</i></p> 	<p>The operators check visually the presence of particles. They take by hand some containers and shake them in front of a double background (black and white)</p>	<ul style="list-style-type: none"> <li>■ Operator is capable to distinguish easily particles from glass defects or printing</li> </ul>	<ul style="list-style-type: none"> <li>■ Not repetitive inspection highly depending on operator attention</li> <li>■ Slow, tedious and tiring job.</li> <li>■ Many operators are required for inspection of high volumes and they must be regularly replaced</li> </ul>
<p><i>Semiautomatic inspection</i></p> 	<p>A machine transports the containers in front of operator and provides shaking, rotation and illumination.</p> <p>The operator checks the containers through a lens</p>	<ul style="list-style-type: none"> <li>■ The operator doesn't need to handle the containers</li> <li>■ The containers are positioned, rotated and lighted always in the same repetitive condition</li> <li>■ Suitable to mid volumes production: one machine replaces 4-6 operators</li> <li>■ Simple and easy maintenance</li> </ul>	<ul style="list-style-type: none"> <li>■ More repetitive inspection but still depending on operator attention</li> </ul>

**METHODS FOR PARTICLES INSPECTION**

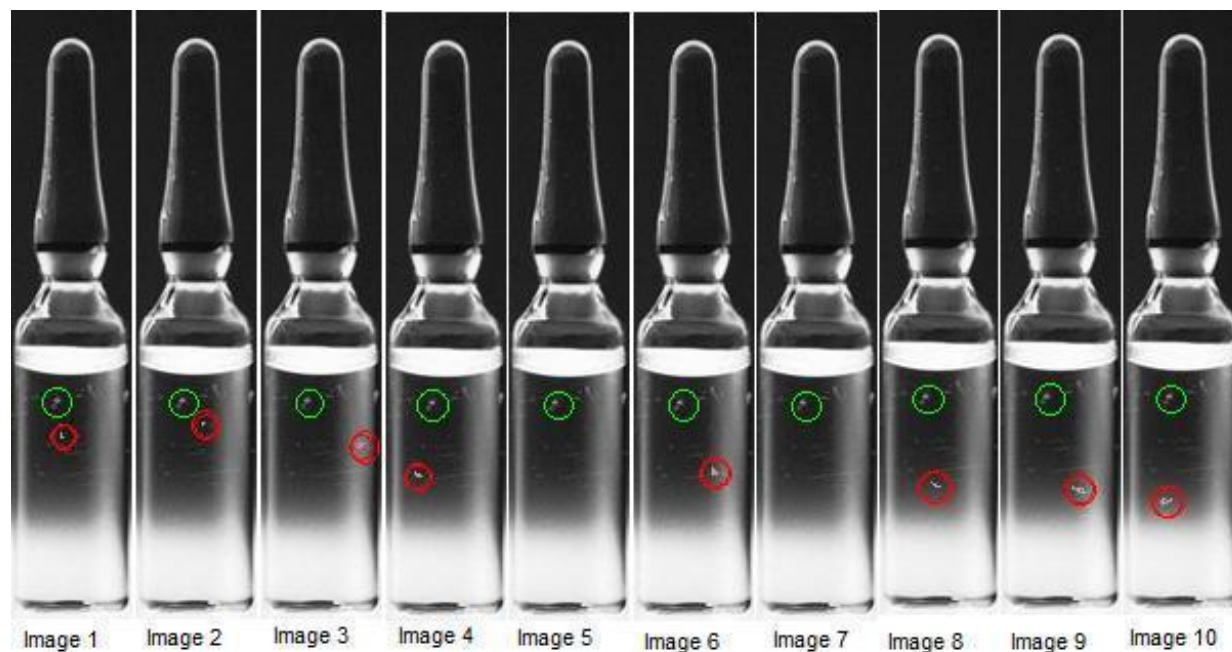
Method	Description	Advantages	Drawbacks
<p><i>Automatic inspection</i></p> 	<p>A machine spins the containers and a camera controls the presence of particles. Inspection is repeated twice for more safety.</p> <p>Filling level is checked too as standard.</p>	<ul style="list-style-type: none"> <li>■ Very fast: there are machines for 150-200-300-400 pcs/hr</li> <li>■ Repetitive</li> <li>■ Easy to be validated by means of 'Knapp test'</li> </ul>	<ul style="list-style-type: none"> <li>■ Some false rejects can be caused by presence of imperfections or large printings on glass sidewalls,</li> <li>■ Some difficulties to inspect coloured or foaming products</li> <li>■ Skilled operators required for maintenance and new products setup</li> </ul>

## PRINCIPLES OF PARTICLES AUTOMATIC INSPECTION

*The PC acquires a sequence of images of the same container that are compared each to the other using the algorithm called 'Image subtraction'.*

*This method allows to distinguish the fixed objects like printings or dust from moving objects like particles.*

*Fixed objects (green circle) are present always in the same pixels in all the images; instead, moving particles (red circle) are detected in different parts of container.*



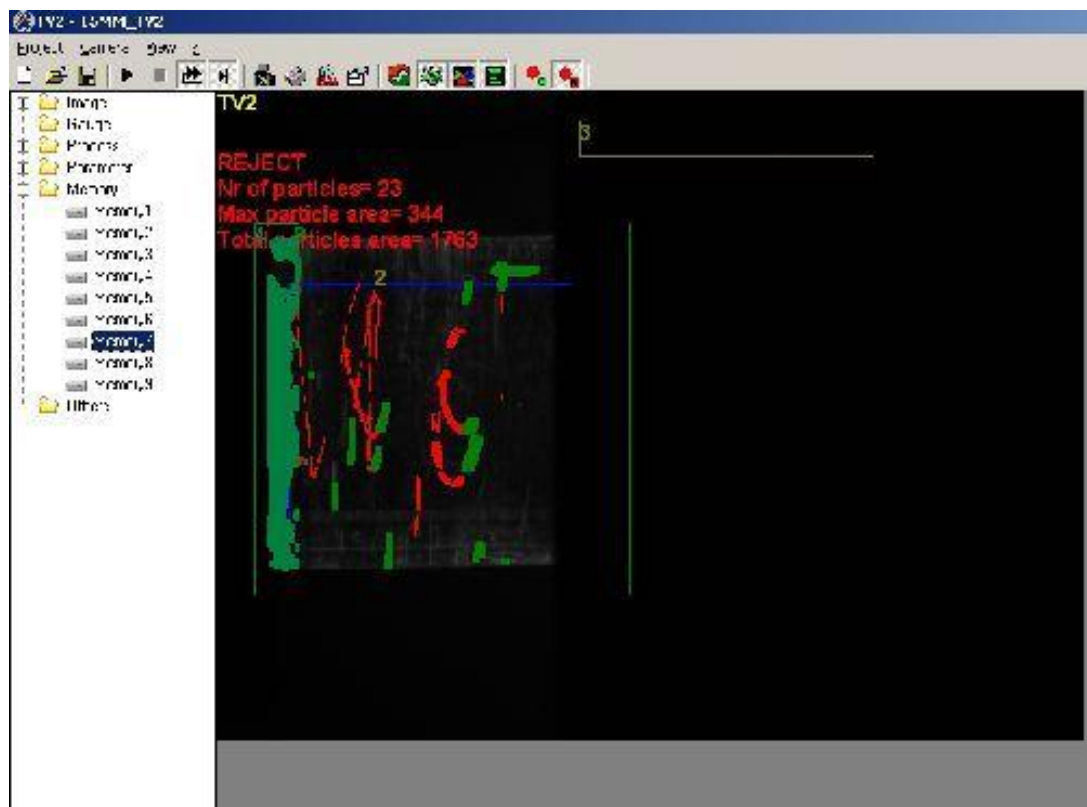


## PRINCIPLES OF PARTICLES AUTOMATIC INSPECTION

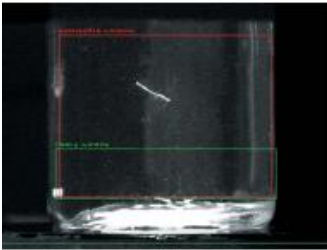
Fixed particles are easily masked by the software and not analyzed (green parts of binarized image)

Moving objects can be analyzed for the dimension of their area. Group of pixels with area bigger than a selectable threshold (red parts of binarized image) are considered particles to be rejected.

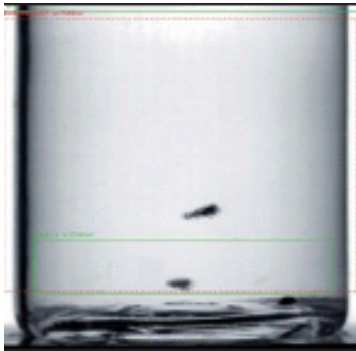
Group of pixels with area lower than the threshold are considered 'acceptable' particles.



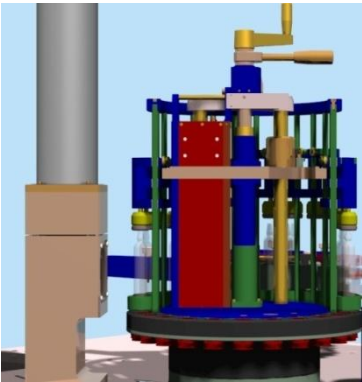
## ILLUMINATION SYSTEMS

Method	Description	Advantages	Drawbacks
<p><i>Bottom light (Tyndall effect)</i></p> 	<p>A high power LED illuminates the container from the bottom.</p> <p>Glass particles reflects the light towards the camera becoming very bright and well visible</p>	<ul style="list-style-type: none"> <li>■ Even very small glass particles becomes visible (below 40 micron)</li> </ul>	<ul style="list-style-type: none"> <li>■ Some false rejects can be caused due to the collateral effect of undesirable reflections caused by imperfections or large printings on glass sidewalls,</li> <li>■ The meniscus must be covered and cannot be inspected</li> <li>■ Dark particles or low reflecting (as fibers) are difficult to be detected</li> </ul>

## ILLUMINATION SYSTEMS

Method	Description	Advantages	Drawbacks
<p><i>Diffused backlight</i></p> 	<p>A matrix of LED illuminates the container from the back with a diffused uniform light.</p> <p>Dark particles produce a shadow blocking the passage of light</p>	<ul style="list-style-type: none"> <li>■ Not reflecting dark particles become visible</li> <li>■ Meniscous area can be inspected too</li> </ul>	<ul style="list-style-type: none"> <li>■ Only very dark and big particles are visible; reflecting light particles are not detectable.</li> <li>■ Only in double polarized version it is possible to detect fibers</li> </ul>

## ILLUMINATION SYSTEMS

Method	Description	Advantages	Drawbacks
<p><i>Collimated backlight</i></p> 	<p>A structured linear light with parallel beams illuminates the container from the back</p> <p>Particles produce a shadow blocking the passage of light</p> <p>A linear camera detects the presence of particles</p>	<ul style="list-style-type: none"> <li>■ All kinds of particles (reflecting and not reflecting) are visible</li> <li>■ Meniscus area can be inspected too</li> <li>■ Repetitive inspection</li> </ul>	<ul style="list-style-type: none"> <li>■ Sensitivity is lower than with Tyndall effect. Only particles over 50 micron can be detected.</li> <li>■ Only the central part of the container is inspected</li> <li>■ Use of linear camera doesn't allow to see the acquired images; it's difficult for the operator to understand the correct working of the machine</li> </ul>

## VALIDATION METHOD

Due to unpredictable movements and not repetitive visibility of particles, their detection is a *statistical phenomenon*.

Pharmacopoeia requirement for the validation of an automatic inspection machine is that the result of automatic inspection must be equal or better than human inspection.

Limits of human inspection are considered the detection of particles as small as 40-50 micron about. In standard human inspection, a 50 micron particles is detected in 50% of inspections.

In order to solve this problem, in early 80's Dr. Julius Knapp developed his method that is not based on the measurement of particles dimensions but on the comparison of the results of the inspection performed by operators and by the machine.

Knapp test is actually the only method for validation worldwide accepted.

## *KNAPP TEST*

Knapp test is a statistical approach to the problem mediating the needs of the production with the needs of quality.

The manufacturer must prepare a batch with 250 containers. 80 containers must be rejects with different types of defects (fibers, small glasses, heavy glasses,...) and the remaining 170 must be taken randomly from the real production.

Each container will be identified univocally by a label with a number.

This batch must be checked visually 10 times by 5 different operators for a total of 50 inspection for each container. It's important to check the containers reproducing the conditions of standard production (speed, illuminations, etc...)

Now, the same batch must be tested 10 times by the automatic machine.

## KNAPP TEST

Each container will have a 'Quality Factor', that is the number of times it was rejected (normalized to 10). For example, the container number xyz could be rejected 8 times on 10 inspection by automatic machine (QF=8) and 35 times on 50 inspection by the 5 operators (QF= 7).

I consider now only the containers with  $QF \geq 7$  and I sum all the number of times they have been rejected. The result is the QF total.

A graphic, like the one in following page, must be prepared and the 'crossed quality factor' must be calculated.

The evaluation of the results is based on two concepts:

1) QF Automatic  $\geq$  QF manual

2) The splitting between surely good (0 rejects on 10 inspection) and the surely bad (10 rejects on 10 inspection) must be as much clear as possible with a 'grey zone' (the containers rejected 4-5-6 times) as small as possible.

**NOTE:** Convel machines have software application for Knapp test automatic execution, calculation of QF factors and printing of graphic chart.



## KNAPP TEST GRAPHIC CHART

	Operator	TV1 or TV2
0	153	150
1	10	10
2	5	5
3	12	3
4	1	1
5	4	1
6	5	2
7	16	3
8	9	5
9	10	10
10	25	60

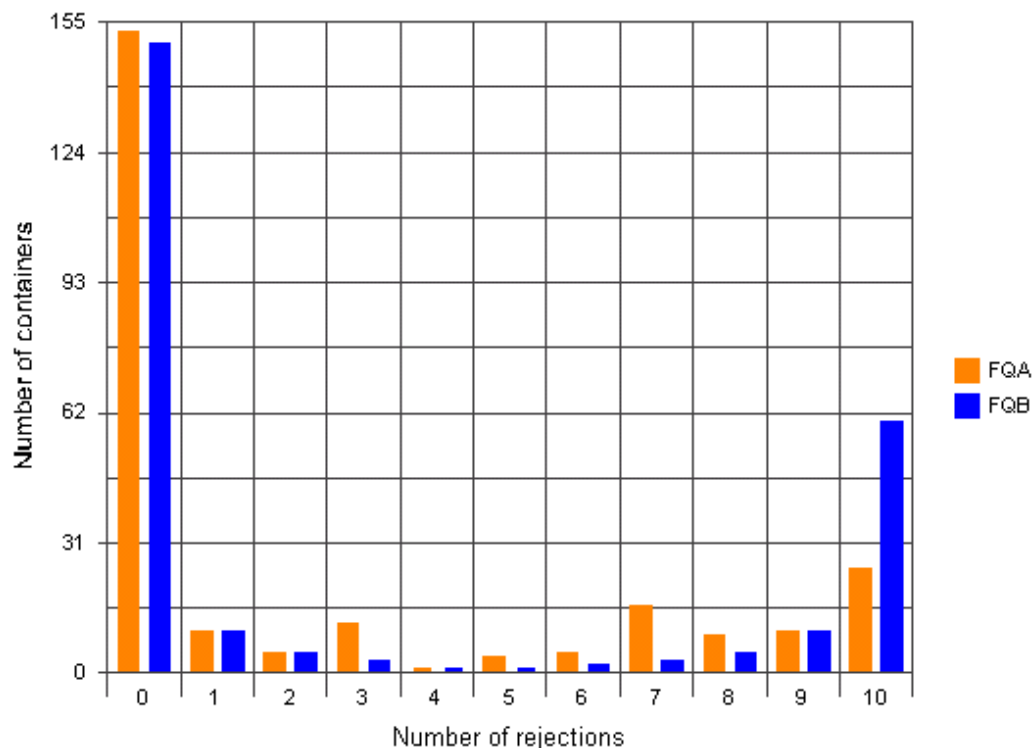
FQA/FQB  
Operators Vs. Automatic

**77,8%**

FQB/FQA  
Automatic Vs.Operators

**109,0%**

Show operator data



FQA= Operator inspection    FQB= Automatic Inspection

***PRESENTATION OF CONVEL***

Convel was founded in 1994 in Vicenza, in North East of Italy.

Aim of this company was the design and manufacturing of electronics equipment.

Since the beginning Convel proposed itself as a R&D outsource group for development of fully new projects: from idea to final product.

In 1998 there was the first contact with pharmaceutical world through some companies located near Vicenza.

By means of know-how coming from the most wide sectors, Convel was capable to supply solutions highly innovative. Actually, Convel has three patents for applications in pharmaceutical inspection.



Convel became soon the supplier of core technology (leak test modules, vision systems, interface software) to well known manufacturers in pharmaceutical world.

Starting from 2009, Convel decided to become itself manufacturer of machines with its own brand and not only supplier of technology.

In only a couple of years a full range of inspection machines was developed. (automatic, semiautomatic, leak test, comby machines, test bench ).

Vertex of the fast growing up and demonstration of quality of its production were the recent sales of the model TS for leak test to the multinational **Sanofi Aventis** in Italy and of the bench EasyTS to the *Laboratory of research for aseptic filling* of **Nestlé Waters** in Marysville, Ohio, USA.

***PRODUCTS OVERVIEW***

## *C2 /C2D - Automatic inspection machine*

**C2: up to 12000 pcs/hr**  
**C2D: up to 24000 pcs/hr**

**Ampoules up to 22.5 diam.**  
**Vials up to 39 mm diam.**

**Standard: particles  
inspection and filling level**

**Option: ampoules tip, vials  
alu-cap inspection**

**Various lighting system  
(backlight or bottom light)  
with long life LED**

**Intermittent motion**



## *TS - Leak test machine*

**For liquid products**

**Ampoules and vials up to 32 mm diam.**

**Up to 24000 pcs/hr**

**High voltage method**

**Minimum conductivity of product  
2-5 microSiemens/cm**

**Continuous motion**





## ***C2 + TS - Particles + leak test machine***

**Ampoules and vials up to 32 mm. diam.**

**Standard: particles inspection, filling level  
and leak test (all in one)**

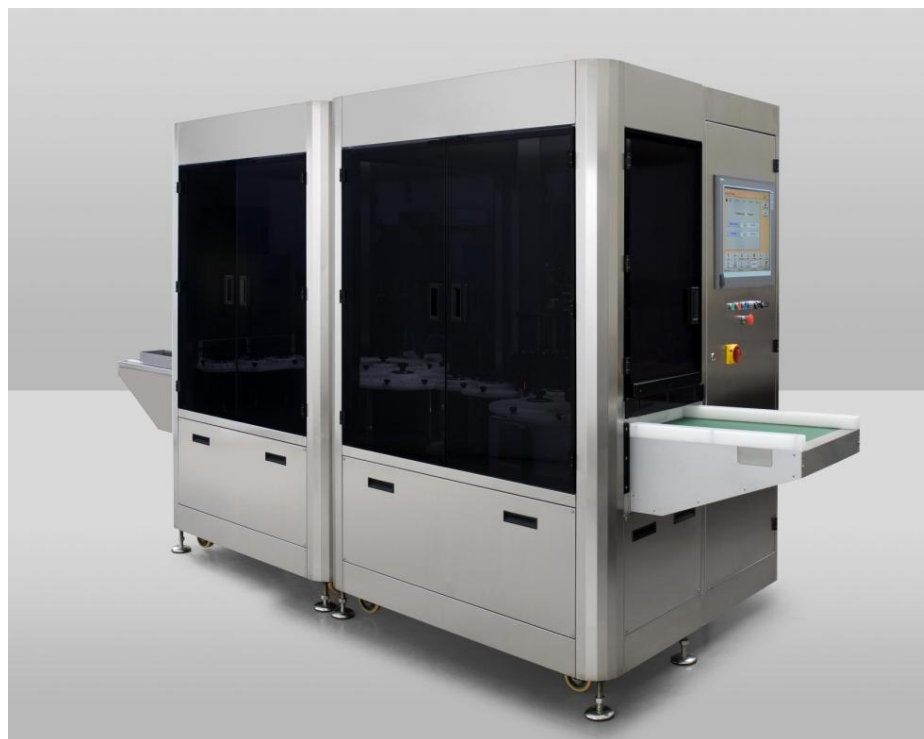
**Option: ampoules tip and vials alu-cap  
inspection**

**Up to 12.000 pcs/hr**

**Various lighting system (backlight or bottom  
light) with long life LED**

**Intermittent motion**

**3700 x 1350 x 1900 mm**



*EASY TS – Bench for off line leak test*

<b>Material</b>	Glass - PET – HDPE - PE
<b>Container</b>	Bottles, ampoules, vials, plastic bags, all kinds of BFS
<b>Product</b>	Liquids, distilled water, drinks
<b>Product conductivity</b>	Over 5 - 10 microSiemens/cm
<b>Sensibility</b>	detection threshold compatible with microorganism dimensions
<b>Method of test</b>	non destructive control using high voltage method test
<b>Dimension</b>	400x360x570mm



## *RC – Semi Automatic Inspection Machine*

**Inspection of foreign matters in  
liquid, freeze dried, powder.**

**Ampoules up to 22.5 diam.  
Vials up to 62 mm diam.**

**High magnification lens**

**Up to 6000 pcs/hr  
(recommended 2000 – 4000 pcs/hr)**



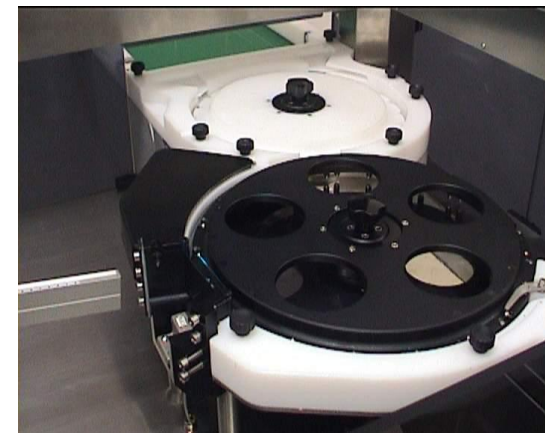
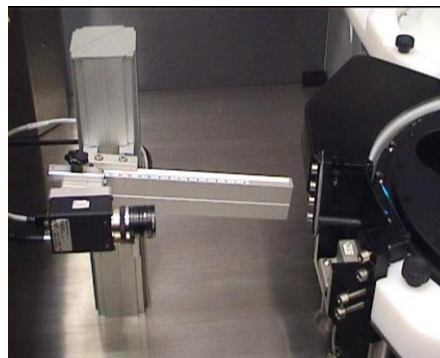
## *VI – Semi Automatic inspection Machine*

**VI-L: inspection of foreign matters in liquid**  
**VI-F: inspection of freeze dried and alu-cap**  
**of vials**

**Ampoules up to 22.5 diam.**  
**Vials up to 32 mm diam.**

**High resolution LCD monitor to visualize**  
**defects**

**Up to 6000 pcs/hr**  
**(recommended 1000 – 3000 pcs/hr)**

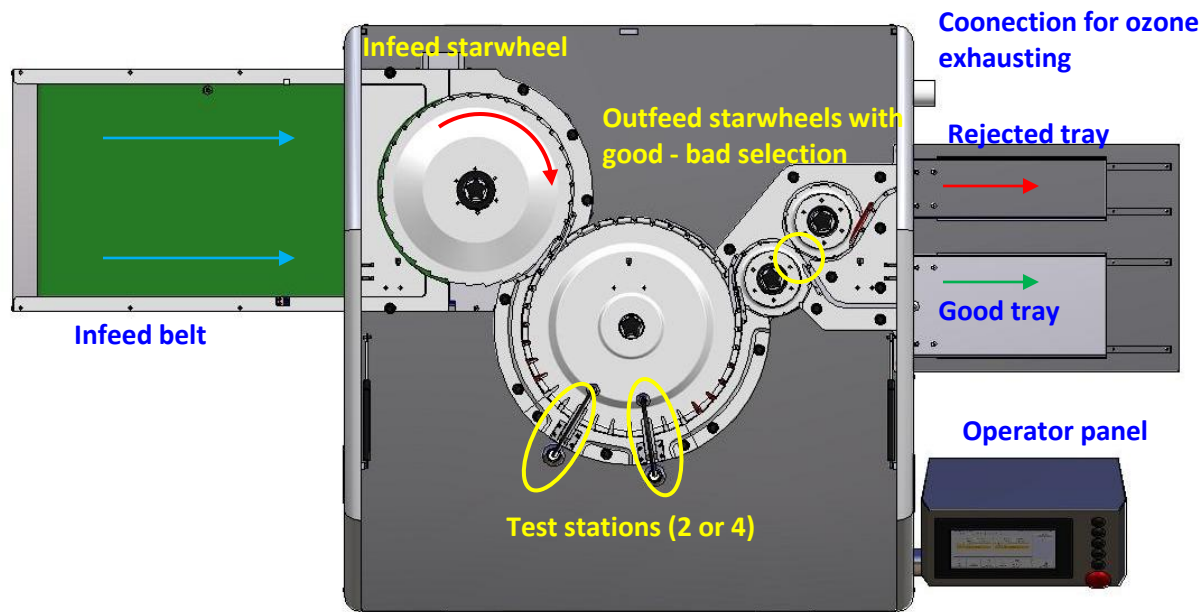


***TWIN SPARK - TS  
LEAK DETECTION MACHINE***





**GENERICS**



**CONTAINERS**  
 Ampoules up to 22.5 diam.  
 Vials up to 32 mm diam

**SPEED**  
 Up to 18.000 pcs/hr in standard version  
 Up to 24.000 pcs/hr in special version

## *TECHNICAL SPECIFICATIONS*

**SPEED:** up to 24.000 pcs/hr (small sizes)

**DIMENSIONS:** 2975x1500x1300

**WEIGHT:** 400 kg.

**POWER SUPPLY:** 230V 50/60 Hz. 1 Ph.

**POWER CONSUMPTION:** 1,5 KW

**UTILITIES:**  
Ozone exhausting connection  
Compressed air

**NOISE:** 75 dB



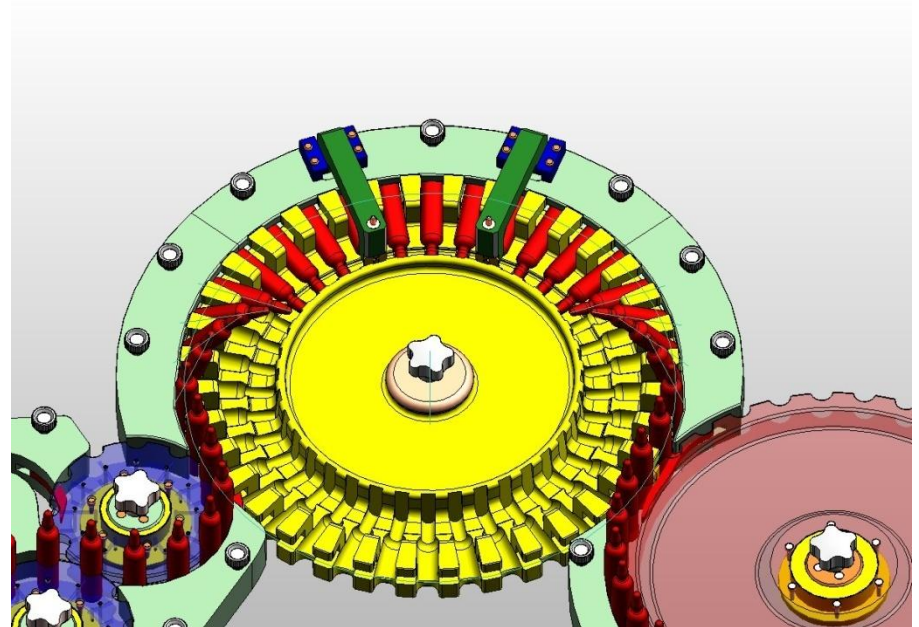


## CONVEL' PATENT

To perform the test it is necessary to put the ampoules in horizontal position.  
Convel patented a mechanical system to get it using a starwheel and an external cam.

### Advantages:

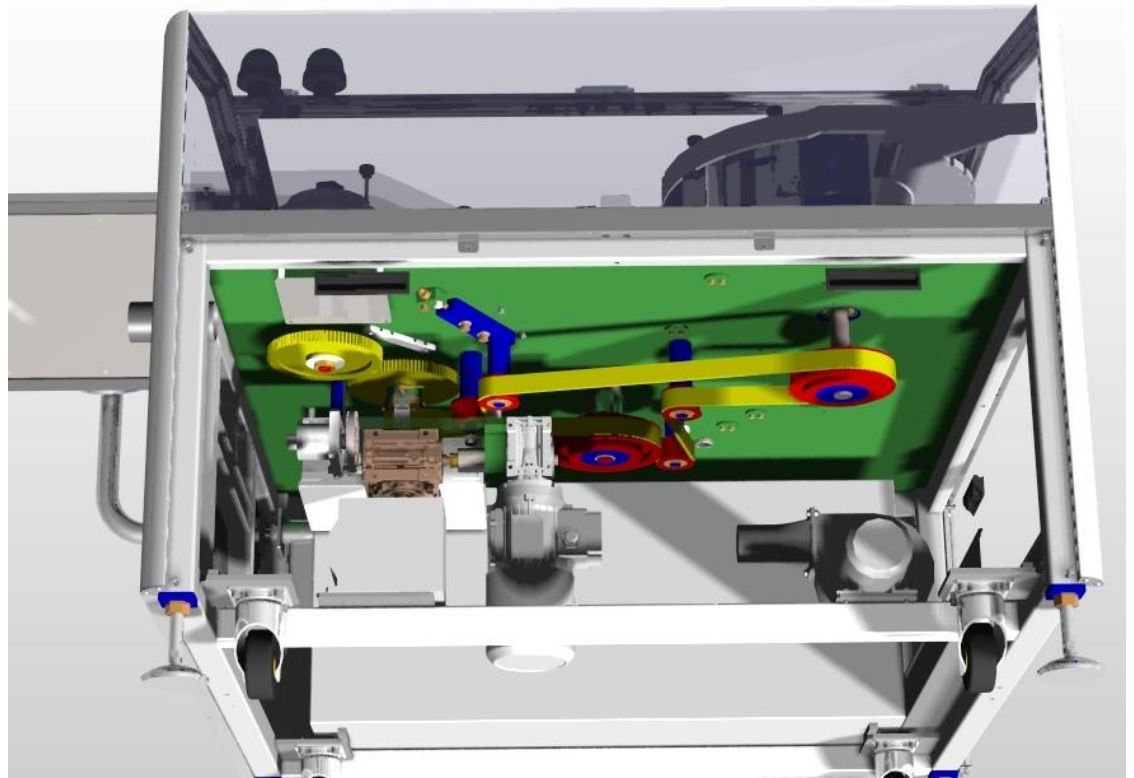
- The machine is very compact and simple
- No need of heavy big parts
- Incredible easyness of size change
- Incredible easyness of cleaning
- Movement of ampoules is very smooth and their position close to the electrodes is very precise and repetitive



## MECHANICS

The patented system for transportation allows a unique simplification of the mechanics and consequently of maintenance.

Only one motor with one power belt moves the whole machine



## PERFORMANCE

**Minimum detectable hole: 1 - 10 micron (tested with calibrated samples made by laser)**

**Minimum conductivity of liquid required: 2 - 5 microSiemens/cm  
(under certain conditions even distilled water or oily products can be checked)**

**Inspection area of ampoules (with four electrodes): tip, neck, body and bottom.**

**No electromagnetic noise nor interference due to presence of high voltage**



## FEATURES

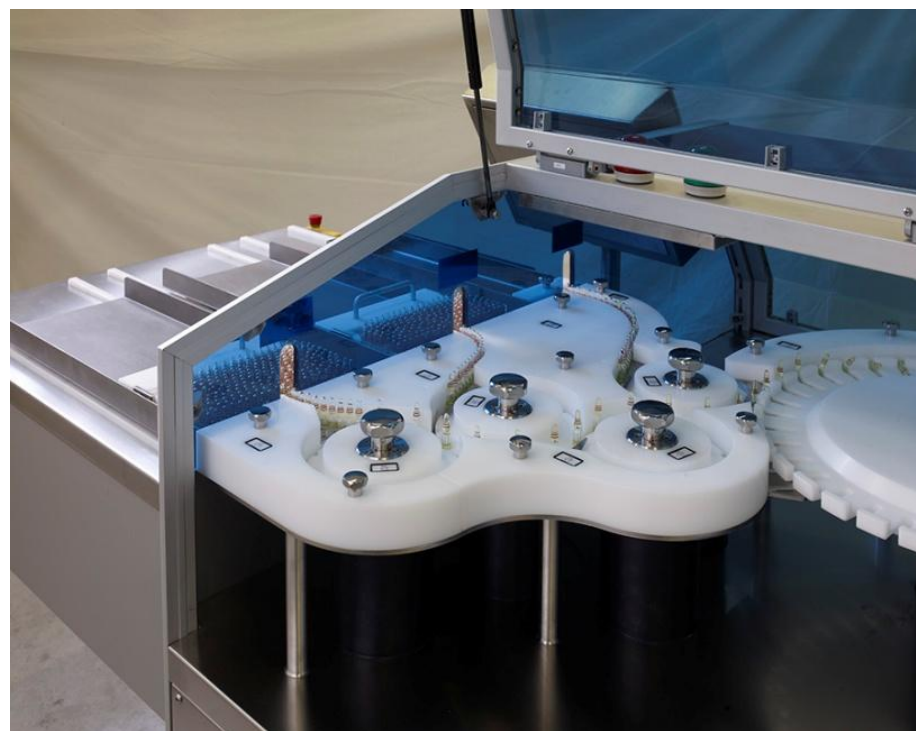
Machine is equipped with clutches, connected to a sensor, at infeed and outfeed to prevent mechanical jam.

Machine is equipped with ozone ( $O_3$ ) exhausting fan to evacuate it from the machine.

A software program allows to empty easily the machine at the end of batch.

A software program allows the visualization of the correct working of all sensors for maintenance purpose.

Special outfeed with exact counting in double tray for higher speed





## SIZE CHANGE

The size change is easily performed replacing the starwheels and selecting the recipes. All parameters are memorized in the PC.

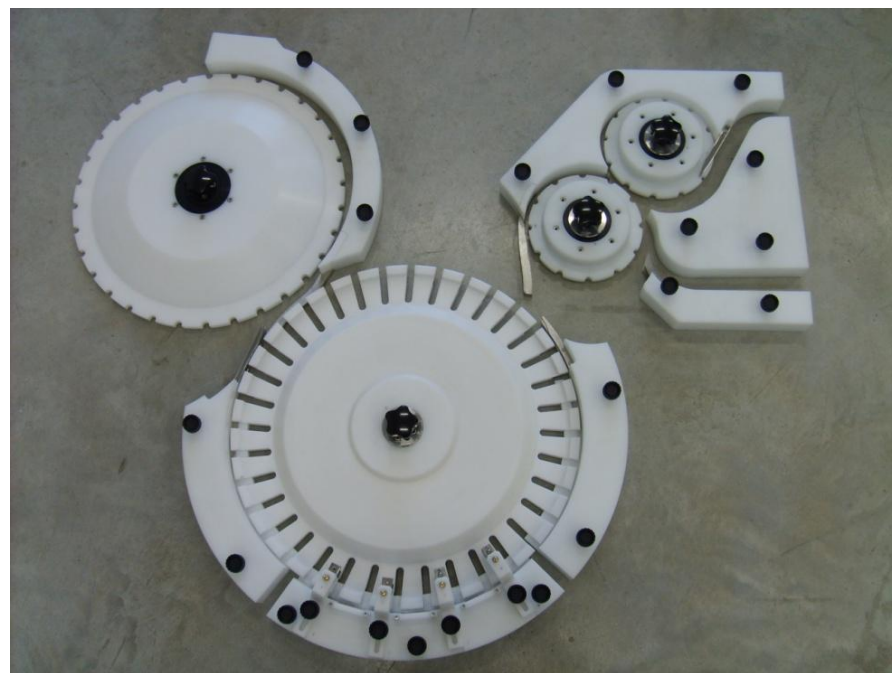
No tools required nor skilled personnel.

15 minutes maximum time.

### **NO ADJUSTMENT REQUIRED FOR ELECTRODES!**

The electrodes are included in the size change it's not required to adjust their position! Every time the size has been changed, new electrodes are in use.

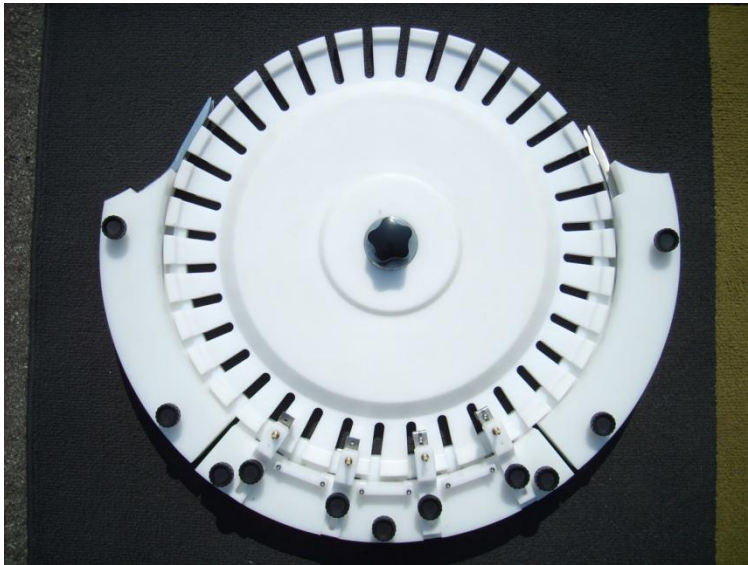
Position of electrodes is fundamental to avoid false results. No possibility of mistakes and higher life of electrodes is guaranteed.



## CLEANING

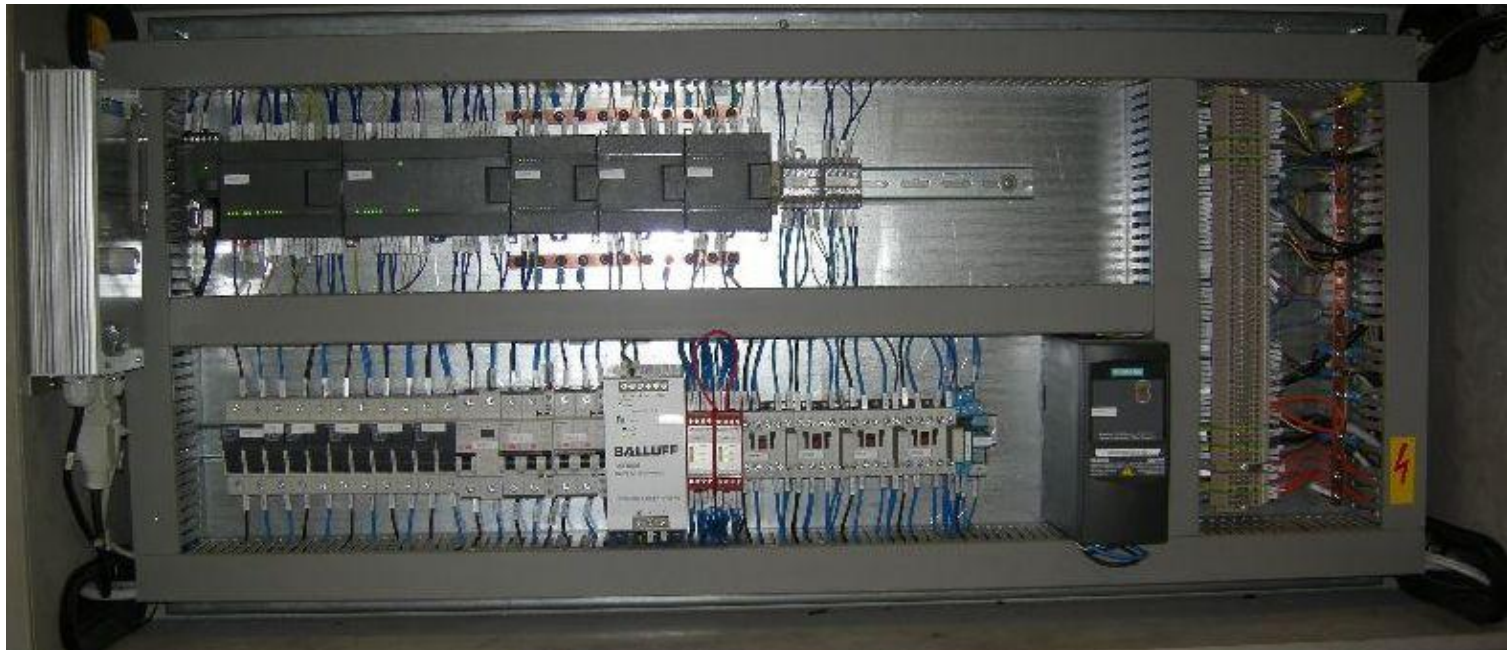
The steel plane allows a full, easy and fast access to all parts when size parts are removed.

Liquid doesn't remain in plastic parts like wormscrew, as in competitor's machine, but falls down over the steel plane through the big holes of the central starwheel.



## *ELECTRIC CABINET*

Electric components are selected among the most known worldwide distributed brands: Siemens PLC S7-200, Siemens inverter, ABB motors, Mitsubishi or Allen Bradley components.



## HMI - Parameters

*Great effort to reduce the number of parameters for easy and fast setup of new products.*

*Only power emitted and sensitivity threshold for average and peak values are the parameters required for leak test!*

PARAMETERS
RUN

	Head 1 ON	Head 2 ON	Head 3 ON	Head 4 ON
	Power [%] <input style="width: 50px;" type="text" value="65"/>	Power [%] <input style="width: 50px;" type="text" value="65"/>	Power [%] <input style="width: 50px;" type="text" value="45"/>	Power [%] <input style="width: 50px;" type="text" value="70"/>
	Time [ms x10] <input style="width: 50px;" type="text" value="10"/>	Time [ms x10] <input style="width: 50px;" type="text" value="10"/>	Time [ms x10] <input style="width: 50px;" type="text" value="10"/>	Time [ms x10] <input style="width: 50px;" type="text" value="10"/>
	Peak	Peak	Peak	Peak
	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>
	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>
	Average	Average	Average	Average
	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>	<input style="width: 100px;" type="text" value="50"/>
	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>	Threshold [%] <input style="width: 50px;" type="text" value="50"/>

 Counters	 Parameters	 Users & Groups	 Manual	 Login	 Logout
 Batches	 Lkt signals	 Products	 Audit trail	 Setup	 ShutDown

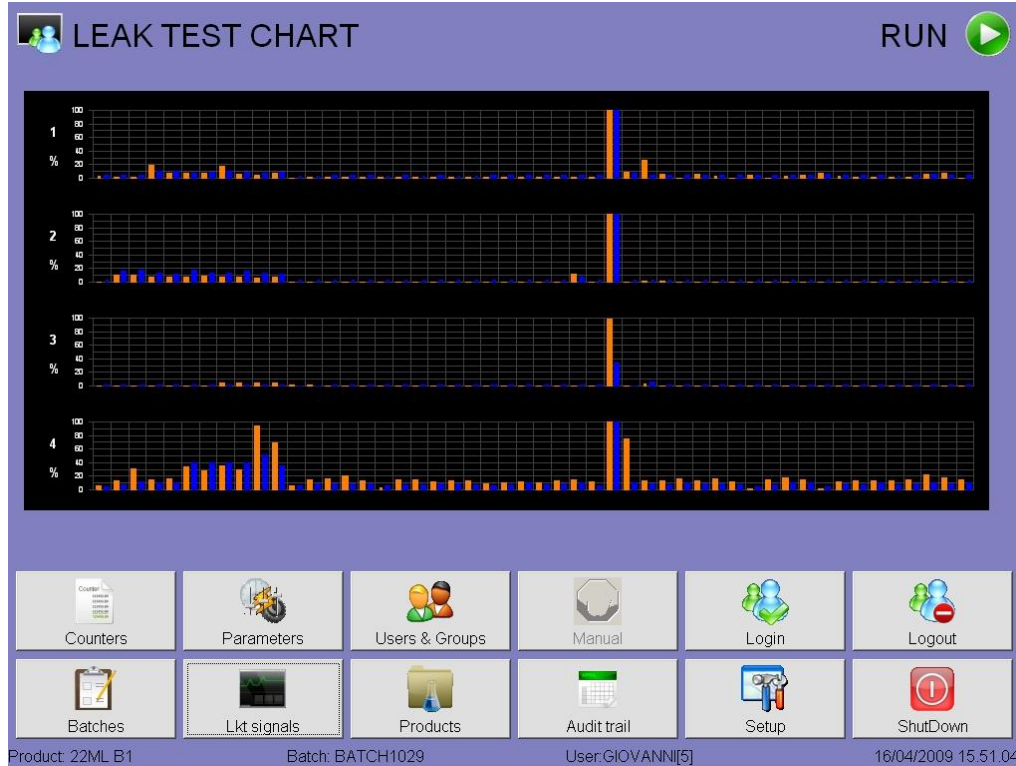
Save Parameters

Parameters report

Product: 22ML B1
Batch: BATCH1029
User: GIOVANNI[5]
16/04/2009 15.51.30



## HMI – Historical report

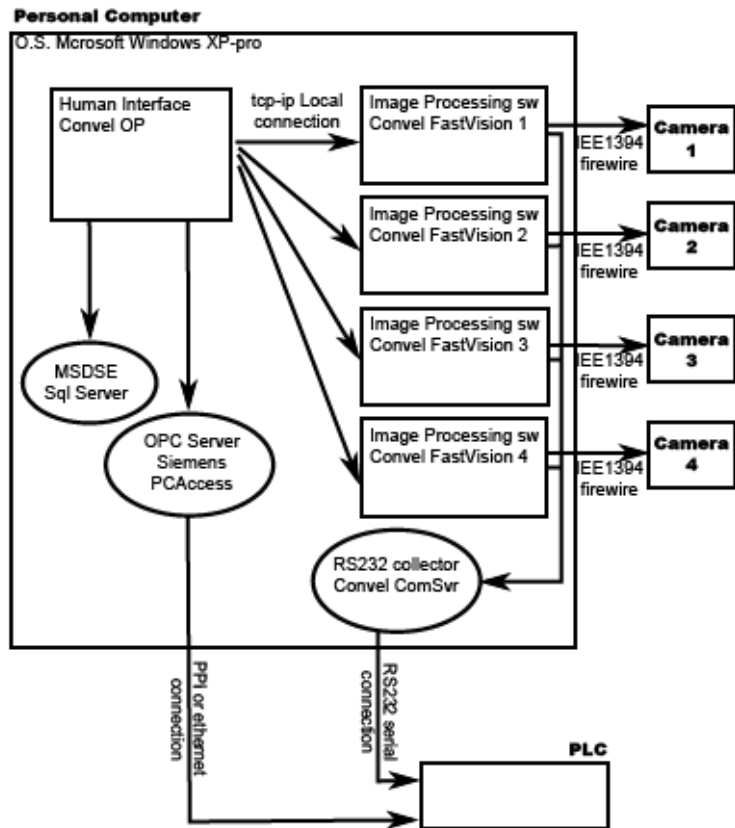


**Visualization in real time of the last 100 results of inspection for each electrode**

# ***C2 / C2D AUTOMATIC INSPECTION MACHINE***



## VISION SYSTEM



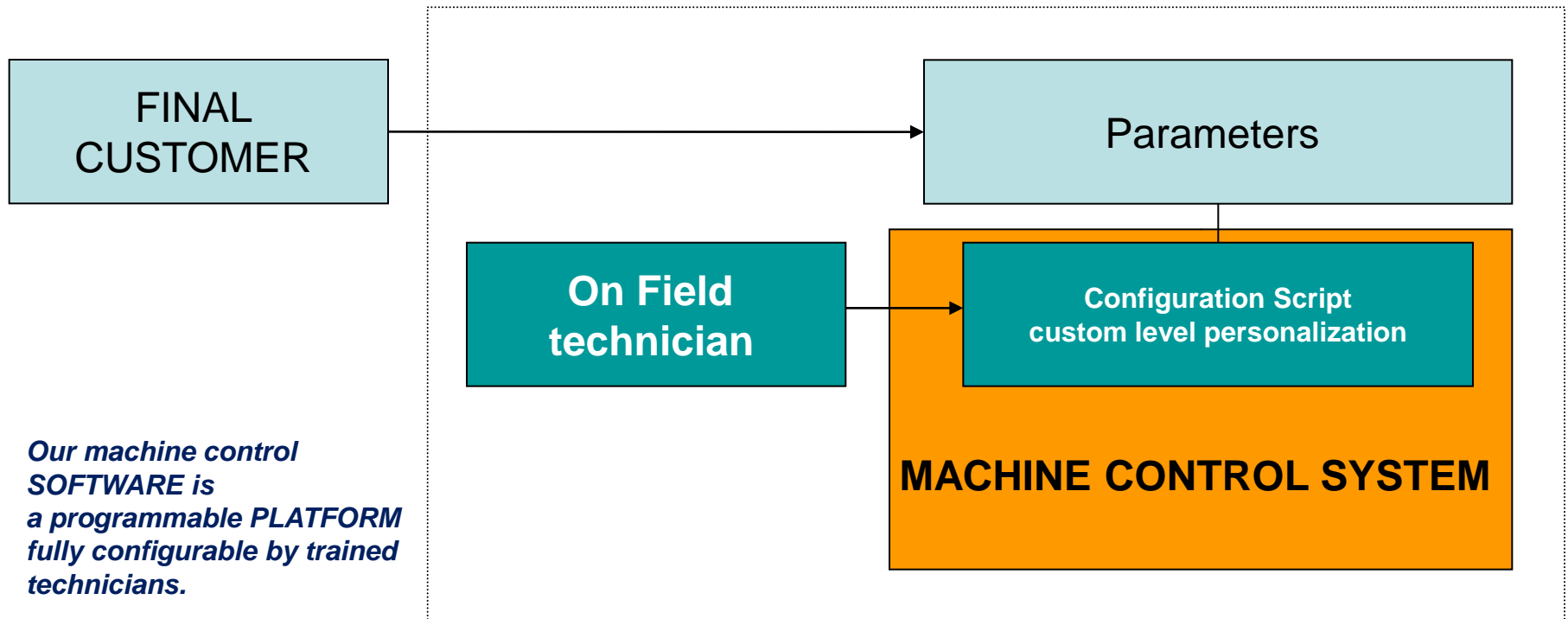
*HW adaptable to inspection needs, using only standard PC and cameras.*

*No need of interface board: cameras are connected directly to PC through IEEE 1394 port*

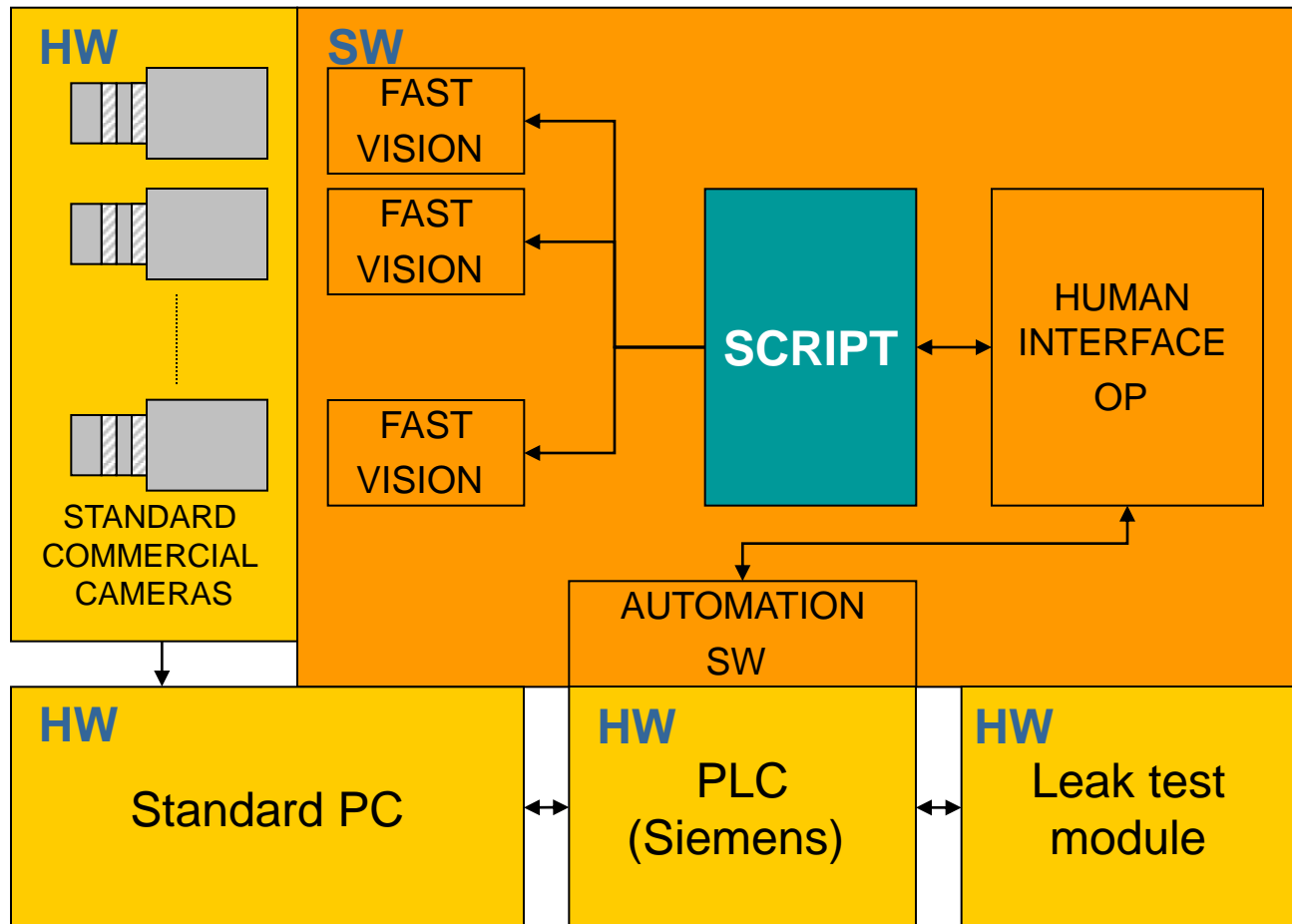
*The software of vision system (called Fast Vision™) is fully developed by Convel and written in Visual Basic.*

*A fully programmable and configurable PLATFORM running on Windows XP integrated with vision system and PLC software.*

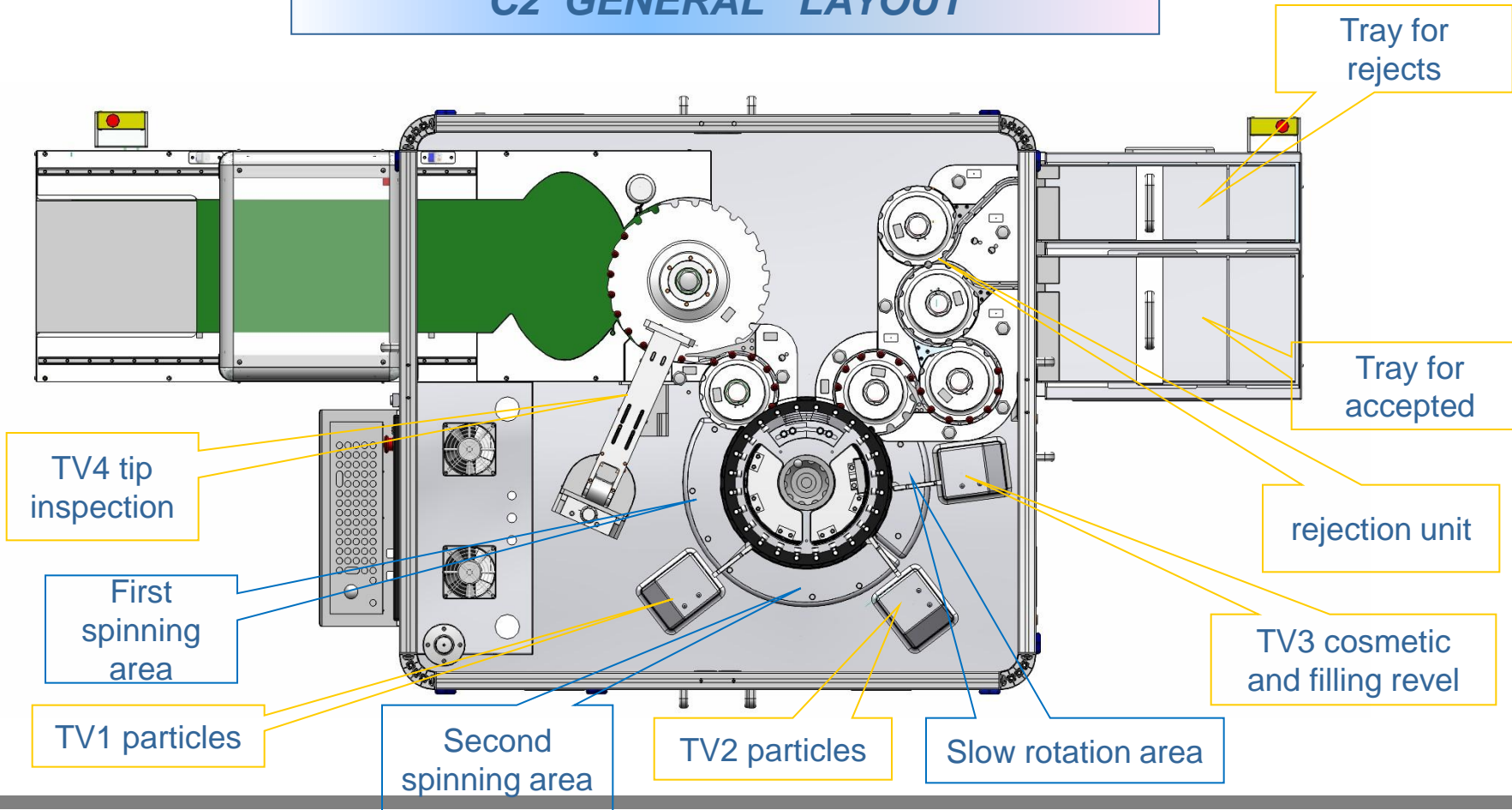
*VISION SYSTEM*



*Our machine control SOFTWARE is a programmable PLATFORM fully configurable by trained technicians.*

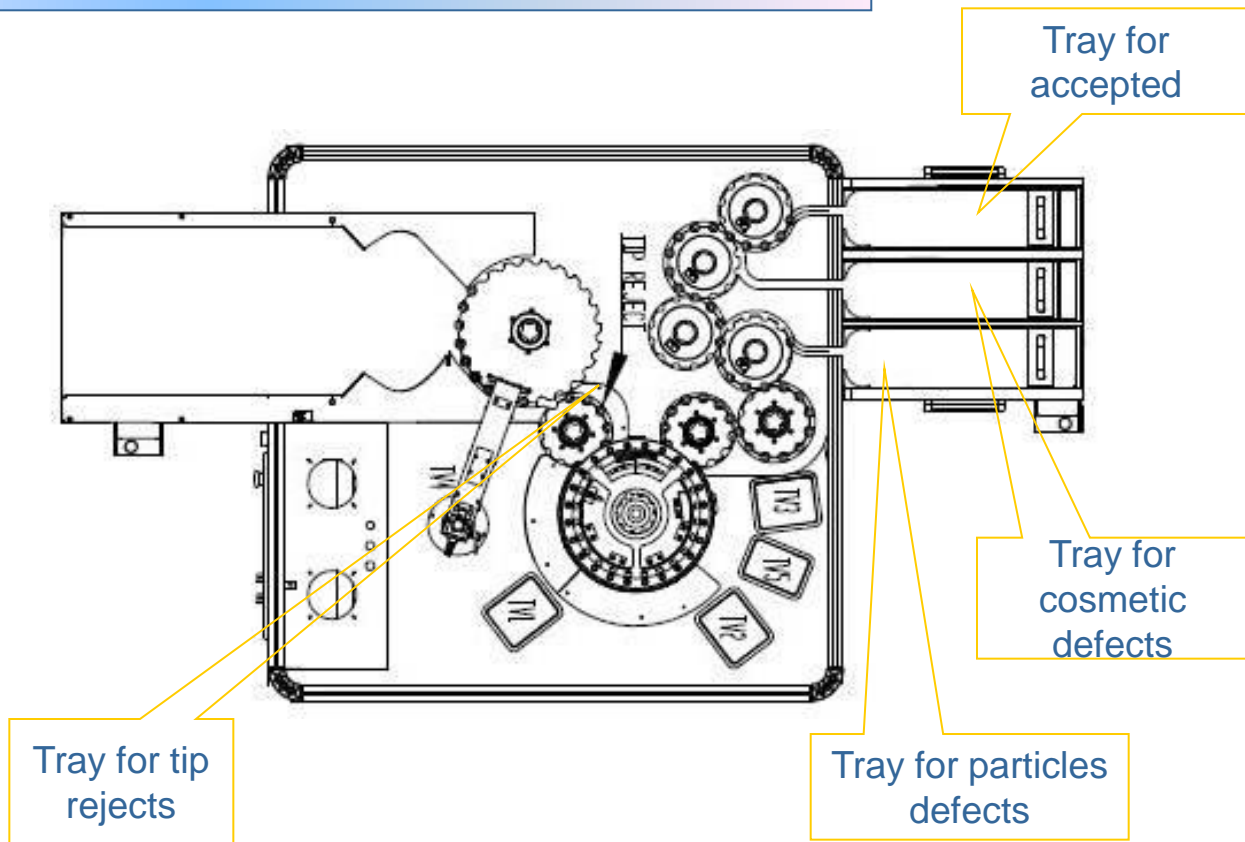


**C2 GENERAL LAYOUT**



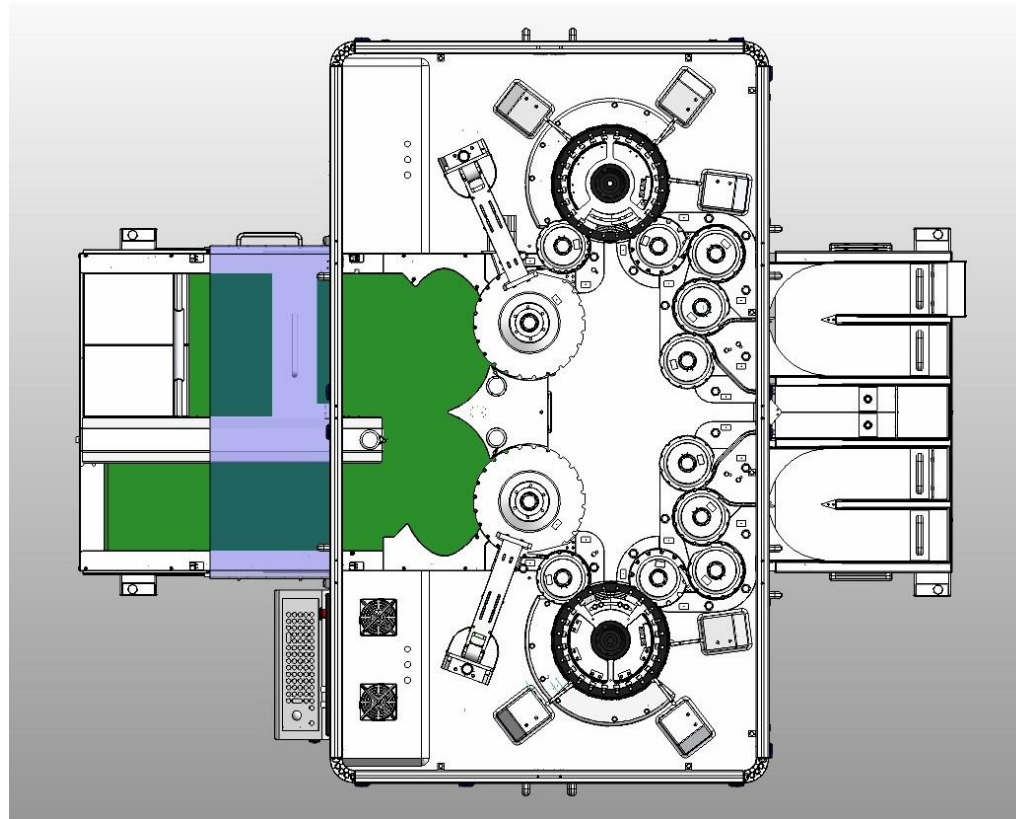
**LAYOUT WITH MULTIPLE REJECTIONS**

- One tray for tip defects before entering in the turret (rejection by falling in a trap)
- One tray for cosmetic defects
- One tray for particles defects





## C2D GENERAL LAYOUT





## TECHNICAL SPECIFICATIONS

**C2: Up to 12000 pcs/hr**  
**C2D: Up to 24000 pcs/hr**  
(for 1ml ampoules)

**DIMENSIONS:**

**C2: 2835x1284x2294**  
**C2D: 2826x2408x2294**

**WEIGHT:**

**C2: 600 kg.**  
**C2D: 1.100 kg.**

**POWER SUPPLY:**

**400V 50/60 Hz. 3 Ph. +N+GND**

**POWER CONSUMPTION:**

**C2: 2,5 KW**  
**C2D: 5 KW**

**UTILITIES:**

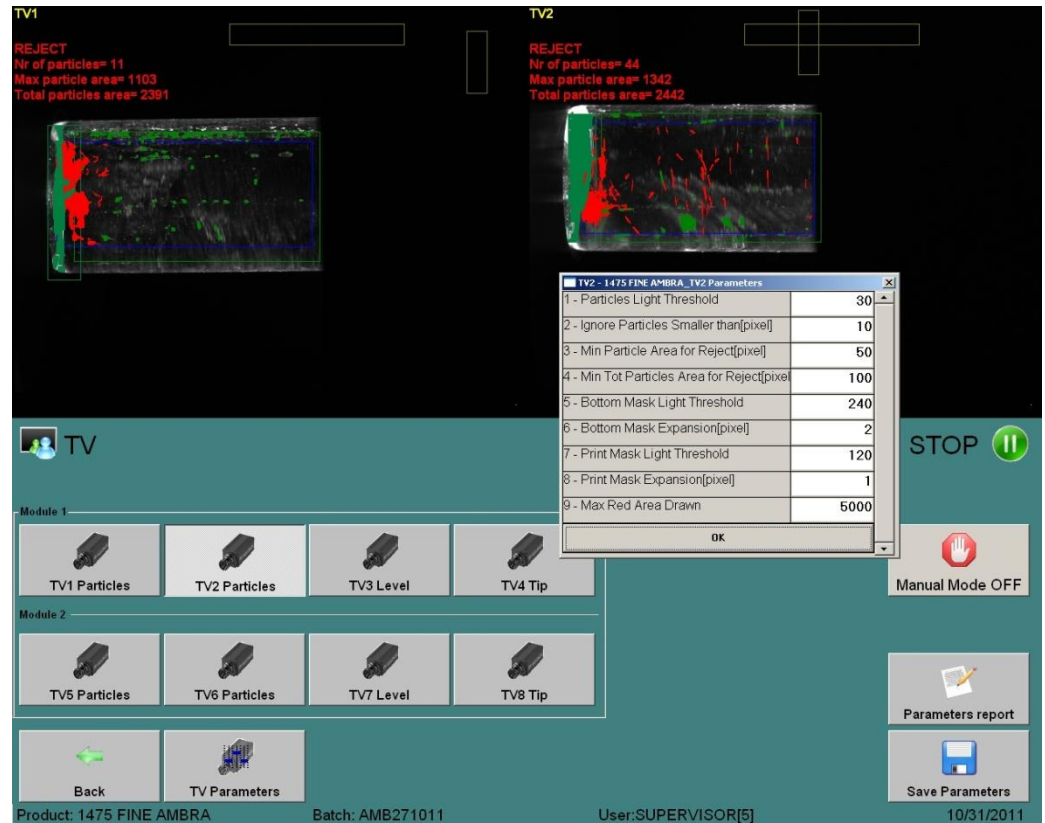
**Compressed air**



## INSPECTION PARAMETERS

In order to allow the customer to setup easily the machine, Convel put a great effort to reduce the number of sensible parameters for the particles detection .

The effect of parameters modification is visualized in real time on acquired binarized images .



**TV1**

REJECT  
Nr of particles= 11  
Max particle area= 1103  
Total particles area= 2391

**TV2**

REJECT  
Nr of particles= 44  
Max particle area= 1342  
Total particles area= 2442

1 - Particles Light Threshold	30
2 - Ignore Particles Smaller than[pixel]	10
3 - Min Particle Area for Reject[pixel]	50
4 - Min Tot Particles Area for Reject[pixel]	100
5 - Bottom Mask Light Threshold	240
6 - Bottom Mask Expansion[pixel]	2
7 - Print Mask Light Threshold	120
8 - Print Mask Expansion[pixel]	1
9 - Max Red Area Drawn	5000

Module 1

TV1 Particles

TV2 Particles

TV3 Level

TV4 Tip

Module 2

TV5 Particles

TV6 Particles

TV7 Level

TV8 Tip

Back

TV Parameters

STOP

Manual Mode OFF

Parameters report

Save Parameters

Product: 1475 FINE AMBRA
Batch: AMB271011
User: SUPERVISOR[5]
10/31/2011

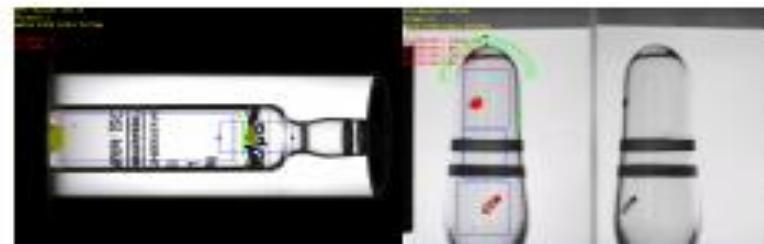
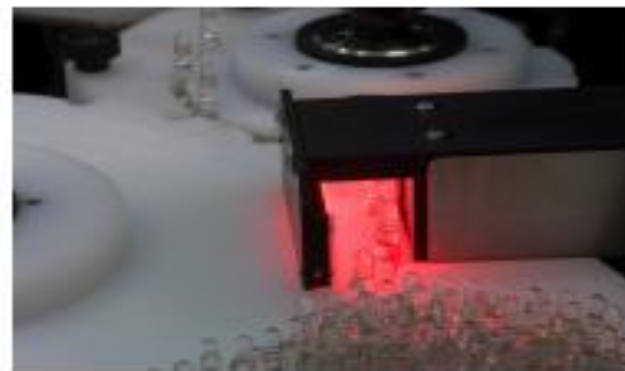
## TIP INSPECTION

**A diffused light illuminates the tip from the back.**

**The ampoule is framed by one camera taking a double image at 90° through a prism.**

**The container doesn't need to be rotated (static inspection).**

**Tip is inspected for height, shape, presence of code rings.**



## ALU-CAP SEALING INSPECTION

A diffused light illuminates the sealing from the back.

The vial is rotated slowly in front of camera (dynamic inspection). The camera takes a fast sequence of images of the profile of the sealing.

All 360° of the circumference is inspected.



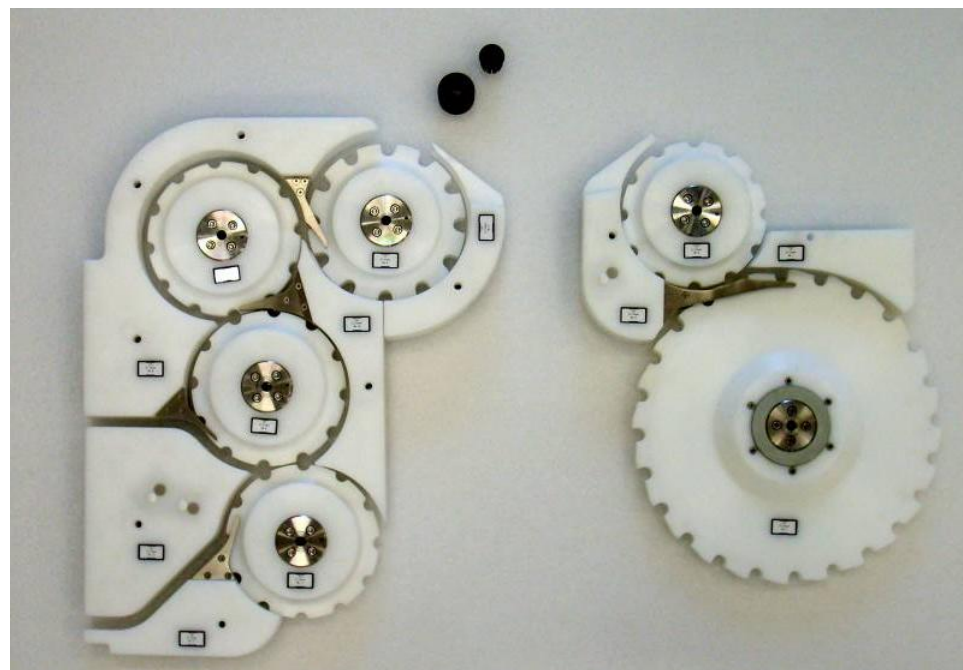
## SIZE CHANGE

The size change is easily performed replacing the starwheels and selecting the recipes.

All parameters are memorized in the PC.

No tools required nor skilled personnel.

20 minutes maximum time.





## FEATURES COMMON TO ALL CONVEL MACHINES

### **MATERIALS:**

All frame is in SS AISI 304

Parts in contact with containers are in SS AISI 316L

Starwheels are in low friction autolubricant plastic (PE or POM C)

All aluminum parts are anodized

Infeed belt is in silicon with low friction coefficient

All mechanical parts are long lasting and maintenance free

### **COMPONENTS:**

MAIN COMPONENTS ARE FROM WORLDWIDE DISTRIBUTED BRANDS:

PLC Siemens S7-200  
PC Proface touchscreen  
Cameras Baumer, Allied, ...  
Asynchronous motors ABB  
Servomotors Mitsubishi  
Inverter Siemens  
Electromechanic Siemens  
Ball bearings SKF  
Laser printer Hewlett Packard  
Sensors Yamatake, Balluff, IFM  
Safety switch Allen Bradley

### **SENSORS:**

Inductive sensors for clutches insertion

Ultrasonic sensors for containers counting

Ultrasonic sensors for rejection verification

Air pressure presence sensor

Sensors for trays presence

Sensor for minimum load

Sensor for spinning verification (C2/C2D)

## HMI - Counters



**Visualization in real time of all counters**

**Visualization of alarms with link to user manual on line**

**Possibility to print, save and export as pdf file on USB key; connection to ethernet line and SCADA systems.**

**Cameras and high voltage parameters are automatically setup through product selection.**

**Unlimited number of recipes is memorizable on PC hard disk and they remain in memory for years.**


 COUNTERS
EMERGENCY STOP 


INSPECTED	0				
ACCEPTED	0	0,0	[%]		
REJECTED	0	0,0	[%]		
OTHERS	0	0,0	[%]		
Reject Box pieces	0				


Alu-Seal TV3	0	0,0	[%]		
Tip Shape TV4	0	0,0	[%]		
Black Spot TV4	0	0,0	[%]		


Particles TV1	0	0,0	[%]		
Particles TV2	0	0,0	[%]		
<b>TOT PARTICLES</b>	<b>0</b>	<b>0,0</b>	<b>[%]</b>		


Level TV1	0	0,0	[%]		
Level TV2	0	0,0	[%]		
Level TV3	0	0,0	[%]		
<b>TOT LEVEL</b>	<b>0</b>	<b>0,0</b>	<b>[%]</b>		


  
Counters


  
Cameras


  
Users & Groups


  
Manual


  
Login


  
Logout


  
Batches

  
Parameters

  
Products

  
Audit trail

  
Setup

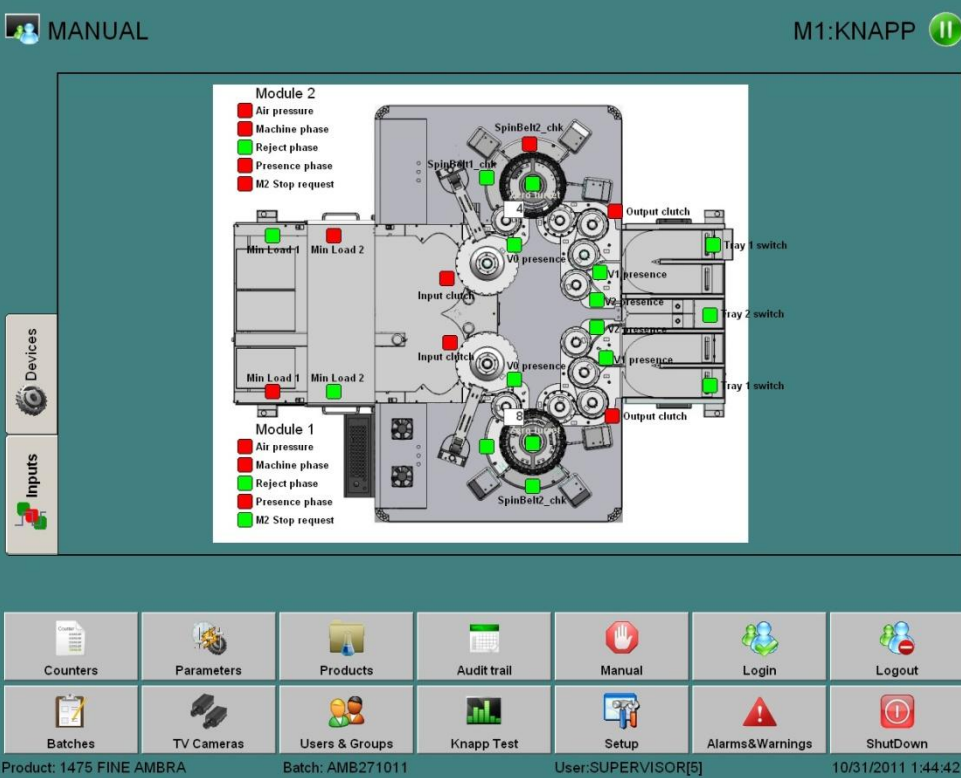
  
ShutDown


Product: ABACO
Batch: ERTERT
User: S1[5]
25/06/2009 9.50.49

*HMI - Maintenance page*

For maintenance and service purpose, the functioning of all sensors appear in a dedicated screen.

All devices are activable individually by means of a jog pushbutton.



**MANUAL** M1:KNAPP 

**Module 2**

- Air pressure
- Machine phase
- Reject phase
- Presence phase
- M2 Stop request















**Module 1**

- Air pressure
- Machine phase
- Reject phase
- Presence phase
- M2 Stop request

**Devices**

**Inputs**

Labels in diagram: Min Load 1, Min Load 2, Input clutch, SpinBelt1\_chk, SpinBelt2\_chk, V1 presence, V2 presence, V3 presence, V4 presence, Output clutch, Tray 1 switch, Tray 2 switch.

 Counters	 Parameters	 Products	 Audit trail	 Manual	 Login	 Logout
 Batches	 TV Cameras	 Users & Groups	 Knapp Test	 Setup	 Alarms & Warnings	 ShutDown



Product: 1475 FINE AMBRA      Batch: AMB271011      User: SUPERVISOR[5]      10/31/2011 1:44:42









## HMI - Passwords levels


*Different alphanumeric password levels (administrator, supervisor, operator, maintenance) with automatic logoff and expiring time.*


*Unlimited number of users*


 USERS
STOP 


Group	User Name	Last Login	L...	Creation Date
 Supervisor	SUPERVISOR	10/31/2011 1:11:24 PM	76	7/5/2011 9:24:01 AM
 Quality	QUALITY	10/25/2011 6:18:32 PM	4	7/5/2011 9:24:01 AM
 Operators	OPERATOR	10/25/2011 6:18:41 PM	4	7/5/2011 9:24:01 AM
 Maintenance	MAINTENANCE	10/19/2011 11:06:51 AM	1	7/5/2011 9:24:01 AM
 Supervisor	GIOVANNI	10/31/2011 12:31:41 PM	2	10/31/2011 12:30:4...


  
Users / Groups


  
Save


  
Add User


  
Delete User


  
Unlock User


  
Counters


  
Parameters


  
Products


  
Audit trail


  
Manual


  
Login


  
Logout


  
Batches


  
TV Cameras

  
Users & Groups

  
Knapp Test

  
Setup

  
Alarms & Warnings


  
ShutDown

Product: 1475 FINE AMBRA
Batch: AMB271011
User: SUPERVISOR[5]
10/31/2011 1:11:44

**HMI - Audit trail & CFR21/PART11**

**Function 'Audit trail' to trace the history of all events memorized in the hard disk of PC (all alarms, login, logout, modification of parameters, batch history, ...)**

**Possibility of connection to local network for data backup and restore**

**AUDIT TRAIL** RUN 

Time	Event	User Name	Batch	Product	OldVal	New...
16/04/2009 15:50:34	LKT PHASE SIGNAL ALARM	GIOVANNI	BATCH1029	22ML B1		
16/04/2009 15:50:27	Login	GIOVANNI	BATCH1029	22ML B1		
16/04/2009 15:50:21	Logout			22ML B1		
16/04/2009 15:50:14	Alarm on reject device			22ML B1	ON	OFF
16/04/2009 15:50:10	Login			22ML B1		
16/04/2009 15:48:02	Start new batch			22ML B1		
16/04/2009 15:47:35	Login			TEST		
16/04/2009 15:40:12	Logout			TEST		
16/04/2009 15:39:54	Login			TEST		
16/04/2009 15:39:48	EMERGENCY STOP			TEST		
16/04/2009 15:39:45	System status			TEST		

aprile 2009

30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

Oggi: 16/04/2009

Filter date: Today | From: 16/04/2009 | to: 16/04/2009

Today

Yesterday

Last Week

Last Month

Last Year

Counters

Users & Groups

Manual

Login

Logout

Batches

Lkt signals

Products

Audit trail

Setup

ShutDown

Product: 22ML B1    Batch: BATCH1029    User: GIOVANNI[5]    16/04/2009 15:52:59

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**Thanks for your kind attention ...**  
**... now it's questions time**