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## 1 - Description

**ILAS** is an assembly modular station by high precision Laser soldering and/or sintering .**ILAS** allows developing industrial processes for high productivity and also for preproduction.

**ILAS** is used too, for power module industrialization for power electronics component.

**ILAS** is easily adjustable, depending on products and assembling processes.

**ILAS** represents an alternative to assembly by reflow oven process. This station provides fast and located overheating benefits to assembling component. It protects the power module of deteriorations due to overheating. The productivity is improved by a reduced cycle time.

### **ILAS** station allows to

- Evaluate different assembly processes with high productivity,
- Improve process by refining parameters
- Customize parameters for each process step
- Control displacement (positioning) and stress generated on component during assembly
- Detect phase changes and interact on the process
- Drive and control laser power

## 2 - Machine technical datas

**Laser** It's controlled by ILAS station, its power is modulated throughout the assembly process. The laser heat input is controlled (geometry, energy profile and laser spot size) in order to allocate evenly the heat on the soldering or sintering area.

**Precision electromagnetic Head** (patent ISP): It allows a component transfer (with position and stress servo-control) and automatic detection of phase changes.

**Pneumatic Press** The additional press device, coupled with electromagnetic head component, allows applying a controlled stress until 200 N on electronic component during sintering process.

**Rectified marble granite** It ensures precision and stability of machine. Operators share the same repository and positioning performances are excellent. 4 anti vibratory shock absorber uncouple the marble and filter vibrations of the surrounding environment.

**Soldering/sintering station and storage area** The worktable is easily replaceable in order to adapt itself to different products and assembly process evolutions. It has a useful soldering and sintering area of 150x150mm and can receive until 6 components racks.

**Components Racks** It allows to present components on storage area on process input. Racks are removable and especially designed for specific application client.

**Modularity: ILAS** can integrate additional functions such as flow removal, solder paste removal, pellet and slab handling, automatic positioning assisted by vision, inerting of work area by neutral gas, component rotation...

## 3 - Assembly processes deals by ILAS

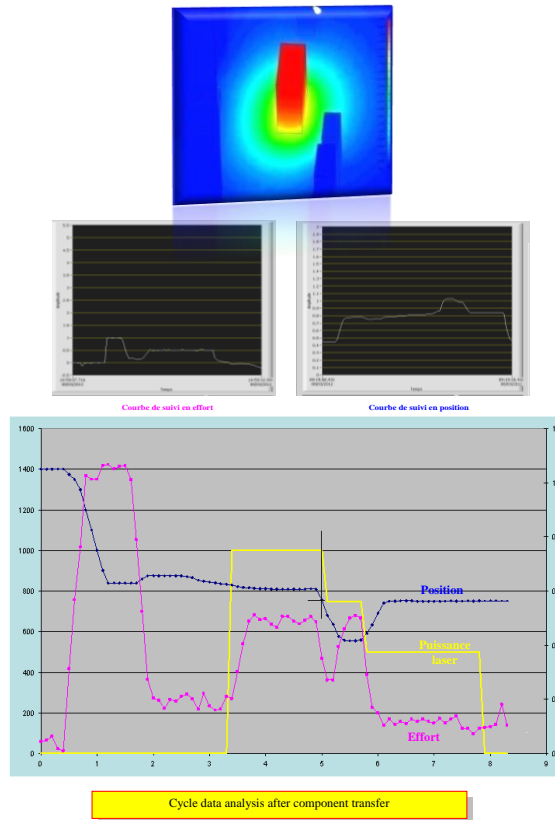
### Processes examples

During soldering or sintering cycle, the electronic component is maintained by aspiration.

- Sintering : Stress applied to component and precise management of laser heat input allow to users to explore all possible combinations of pressure and temperature in order to define his laser sintering process
- Soldering: The component position compared with lead frame is controlled. This one allows a best soldering quality than conventional soldering and also allows a soldering with NO-voids.

## 4 - Laser

Basic Version, ILAS includes laser heat input YAG of 1KW continuous. This power allows reaching the lead frame at a temperature of 250 ° within 2 S. The spot size is configurable between 4 to 16 mm with an energy repartition “Top Hat”. The temperature is homogeneous on the subordinate face on component. The overheating power is piloted throughout the process.



## 5 - Operation

**Programming** Interface Homme-Machine (IHM) allows operator to select the program to be used during its manufacturing campaign. Beforehand programs are created on a user-friendly interface in the form of steps. These steps define the sintering or soldering component process.

**Tracking process** During the cycle process, displacements and stress are displayed in real time on IHM. The operator can keep track of the process and check that the transfer cycle complies with scheduled sequences.

**Analysis and post-treatment** Parameters and data are saved for post treatment analysis of events appeared during process cycle. This analysis allows improving process and the combination of laser with electromagnetic head operation.

Laser		YAG : 1kW continuous
Power consumption		5kVA
Electromagnetic component	head	Soldering stress : $\pm 5N$ , sintering stress: 200N , Travel range: 2 mm
electromagnetic Manipulator	head	3 servo axes , no interpolated: X, Y Z Axes X Y: Linear Motors and precision measuring. Axis Z: motor/ brushless brake absolute encoder. Axes Positioning Repeatability : $\pm 1\mu m$ .
Laser head		Beam type: « Top Hat » Head optic interchangeable
Laser head Manipulator		2 servo axes and no interpolated : XY Axes X Y: Linear Motors and precision measuring. Axes positioning repeatability: $\pm 1\mu m$ . Axes Displacement regardless to electromagnetic head manipulator
Machine Dimensions		1400mm x 1200mm x 2000mm
Machine Weight		1 Ton

ILAS COMPOSITION	Base	Option	Comment
<b>Machine</b>			
Frame/ carterisation / marble	✓		
Axes XYZ electromagnetic head	✓		No interpolated, useful work area: 150 x 150 mm Clearance Z electromagnetic Head: 150 mm
Axes XY Laser head	✓		
Interpolation axes		✓	
Datum setup in Z	✓		Integrated precision contact
Central fume extraction	✓		Adapted to clean room classes 1000
Monitoring canera cycle	✓		Movements Visualization of manipulators on screen

ELECTROMAGNETIC HEAD			
Electromagnetic head	✓		
Electromagnetic Head rotation		✓	
Die collect	✓		3 die collect provided staffing original
Components taking by aspiration	✓		Taking supervising and removal by vacuostat
Fixed constraint gauge		✓	Fixed sensor in order to check periodically stress generated by electromagnetic head
Inerting of Transfer	✓		Concentrically inerting gaz blowing forecasted to die collect
Additional prehension systems		✓	4 available locations around the electromagnetic head
Sintering paste or Flow removal Systems		✓	

WORK TABLE			
Specific table to the application in machined and corrected aluminum	✓		Arrangement of work table to define _2 centering tools forecasted for pallet indexing
Components racks	✓		3 standard racks included and defined according to customer needs.
Racks' identification	✓		Encoding and detection by inductive sensors
Client product-holder pallet		✓	Possibility to expertise it and manufactured by ISP on customer request.

LASER SOURCE			
Laser heat input	✓		Integrated on rack frontage 19"
Cooling unit		✓	Connecting to a standard chilled water network or (in option) to a external cooling unit
Control Laser Power	✓		By the PLC analog output 0-10V
Control by pyrometer		✓	Possible servo power on pyrometer
Calorimeter		✓	For periodically laser power checking

LASER HEAD			
Specifics lens		✓	To choose according to geometry and sport laser size requested
Protection by crossjet	✓		
Window protective	✓		
Laser pointer	✓		Allow to display laser impact
Integrated camera for a laser impact displaying		✓	

AUTOMATIC DEVICE			
Architecture	✓		Siemens PLC and semi-industrial PC, Touchscreen
Machine control software	✓		Allow to operate electromagnetic head , axes and laser
Specific operating mode	✓		Sensing surface, datum setup, components removal cold setting modes ...
Security	✓		Security access management included
Data filing	✓		For each transfer, data archived CSV format but available on Txt or Excel format. .